(1) Find the distance between the given points $(-4, 5)$ and $(1, 6)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

Math1414eliz Skp

(1)

1/18/17

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$d = \sqrt{((-4) - (1))^2 + ((5) - (6))^2}$$

$$d = \sqrt{(-4-1)^2 + (5-6)^2}$$

$$d = \sqrt{(-5)^2 + (-1)^2}$$

$$d = \sqrt{25 + 1}$$

$$d = \sqrt{26}$$

2. Find the midpoint of the line segment joining the points (2d)

$(4, -5)$ and $(6, 5)$.

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$\text{midpoint} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\text{midpoint} = \left(\frac{(4)+(6)}{2}, \frac{(-5)+(5)}{2}\right)$$

$$\text{midpoint} = \left(\frac{4+6}{2}, \frac{-5+5}{2}\right)$$

$$\text{midpoint} = \left(\frac{10}{2}, \frac{0}{2}\right)$$

$$\text{midpoint} = (5, 0)$$

3. Determine whether the given points are on the graph of the equation $y^2 = x^2 - 9$ (3)

a. $(0, 3)$ x y

$y^2 = x^2 - 9$

$(3)^2 = (0)^2 - 9$

$(3)(3) = (0)(0) - 9$

$9 = 0 - 9$

$9 \neq -9$

NO

b. $(3, 0)$ x y

$y^2 = x^2 - 9$

$(0)^2 = (3)^2 - 9$

$(0)(0) = (3)(3) - 9$

$0 = 9 - 9$

$0 = 0$

YES

c. $(-3, 0)$ x y

$y^2 = x^2 - 9$

$(0)^2 = (-3)^2 - 9$

$(0)(0) = (-3)(-3) - 9$

$0 = 9 - 9$

$0 = 0$

YES

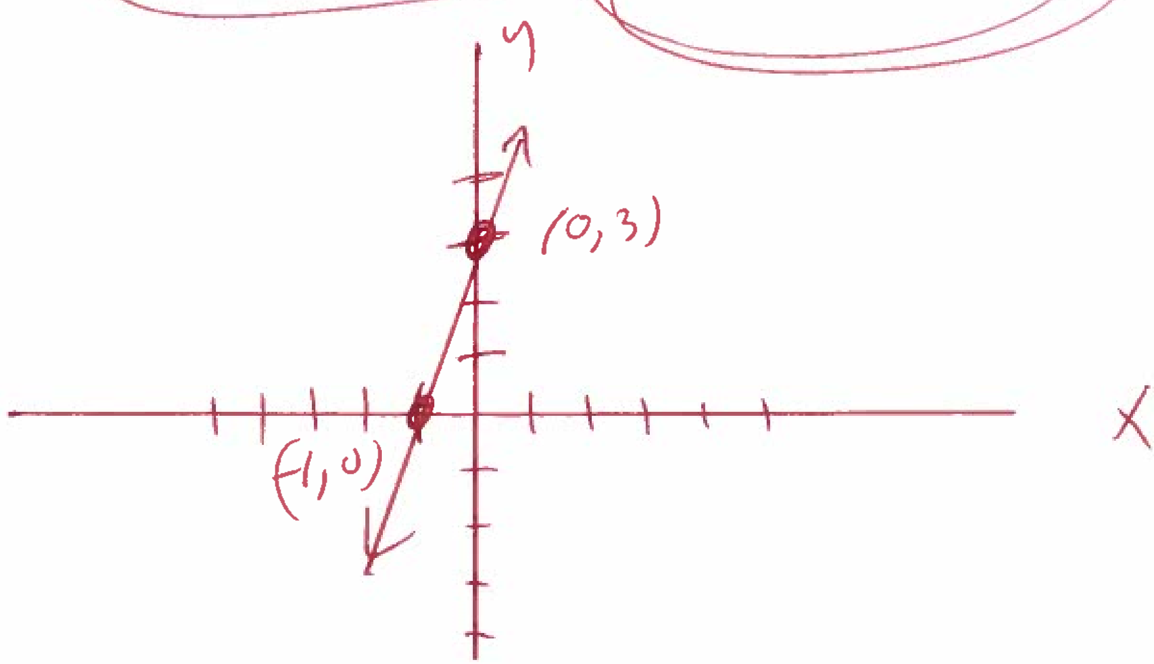
4. Find the intercepts and use them to graph the equation $y = 3x + 3$ (4)

find x-intercepts let $y = 0$

$$y = 3x + 3$$
$$0 = 3x + 3$$
$$0 - 3 = 3x + \cancel{3} - \cancel{3}$$
$$-3 = 3x$$
$$\frac{-3}{3} = \frac{3x}{3}$$
$$-1 = x \rightarrow (-1, 0)$$

find y-intercepts let $x = 0$

$$y = 3x + 3$$
$$y = 3(0) + 3$$
$$y = 0 + 3$$
$$y = 3 \rightarrow (0, 3)$$



5. Find the intercepts and graph the equation by plotting points. (5)

$y = x^2 - 1$

find x-intercepts let $y = 0$

$y = x^2 - 1$

$0 = x^2 - 1$

$0 = (x)^2 - (1)^2$

$0 = (x+1)(x-1)$

use formula $a^2 - b^2 = (a+b)(a-b)$

set

$x+1 = 0$ OR $x - 1 = 0$

$x+1-1 = 0-1$ OR $x-\cancel{1}+\cancel{1} = 0+1$

$x = -1$ OR $x = 1$

$(-1, 0)$ $(1, 0)$

find y-intercepts let $x = 0$

$y = x^2 - 1$

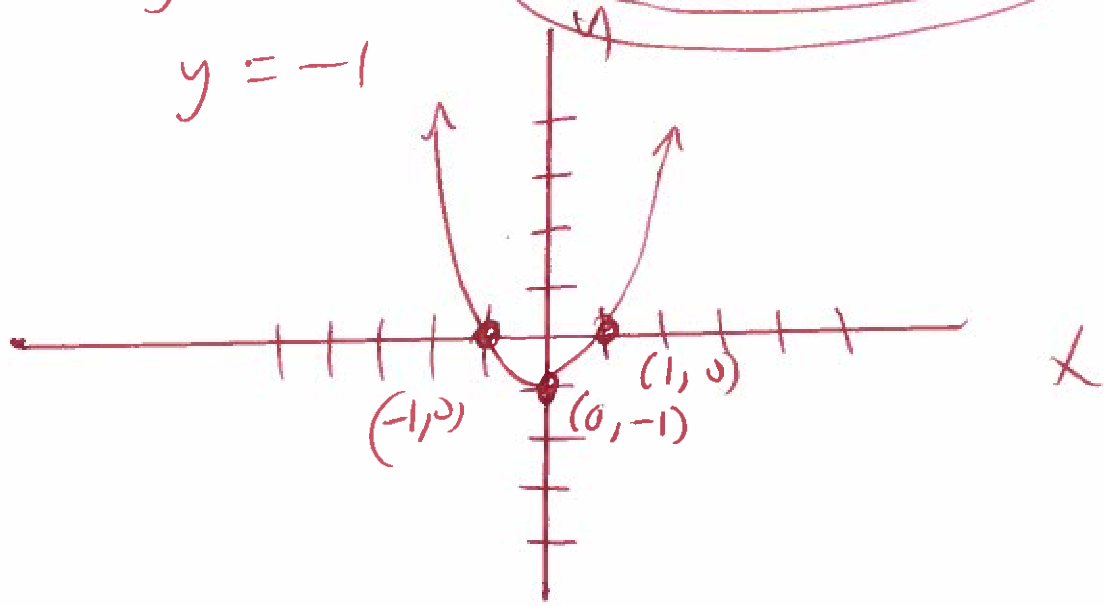
$y = (0)^2 - 1$

$y = (0)(0) - 1$

$y = 0 - 1$

$y = -1$

$(0, -1)$



⑥ Find the intercepts and graph the equation by plotting points. (6)

$y = -x^2 + 16$

find x-intercepts let $y = 0$

$y = -x^2 + 16$

$0 = -x^2 + 16$

$0 = 16 - x^2$ rewrite

$0 = (4)^2 - (x)^2$ use formula $a^2 - b^2 = (a+b)(a-b)$

$0 = (4+x)(4-x)$

set $4 + x = 0$ OR $4 - x = 0$

$\cancel{4} + x \cancel{- 4} = 0 - 4$ OR $\cancel{4} - x \cancel{- 4} = 0 - 4$

$x = -4$

$-x = -4$

$\frac{-x}{-1} = \frac{-4}{-1}$

$x = 4$

$(-4, 0)$ $(4, 0)$

find y-intercepts let $x = 0$

$y = -x^2 + 16$

$y = -(0)^2 + 16$

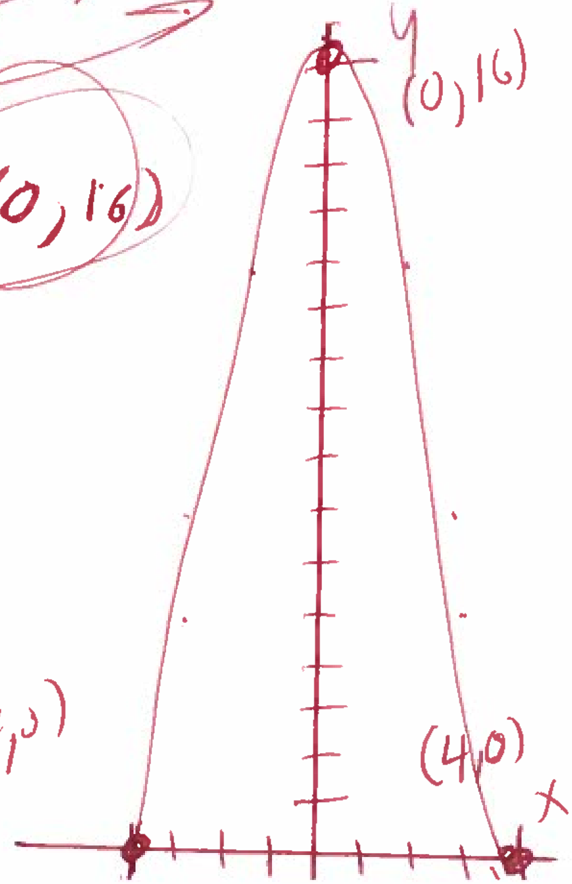
$y = -(0)(0) + 16$

$y = -(0) + 16$

$y = 0 + 16$

$y = 16$

$(0, 16)$



7. Find the intercepts and graph the equation by plotting points. ①

$3x + 4y = 12$

Find the x-intercept let $y = 0$

$3x + 4y = 12$

$3x + 4(0) = 12$

$3x + 0 = 12$

$3x = 12$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{12}{3}$

$x = 4$ $(4, 0)$

Find the y-intercept let $x = 0$

$3x + 4y = 12$ $(0, 3)$

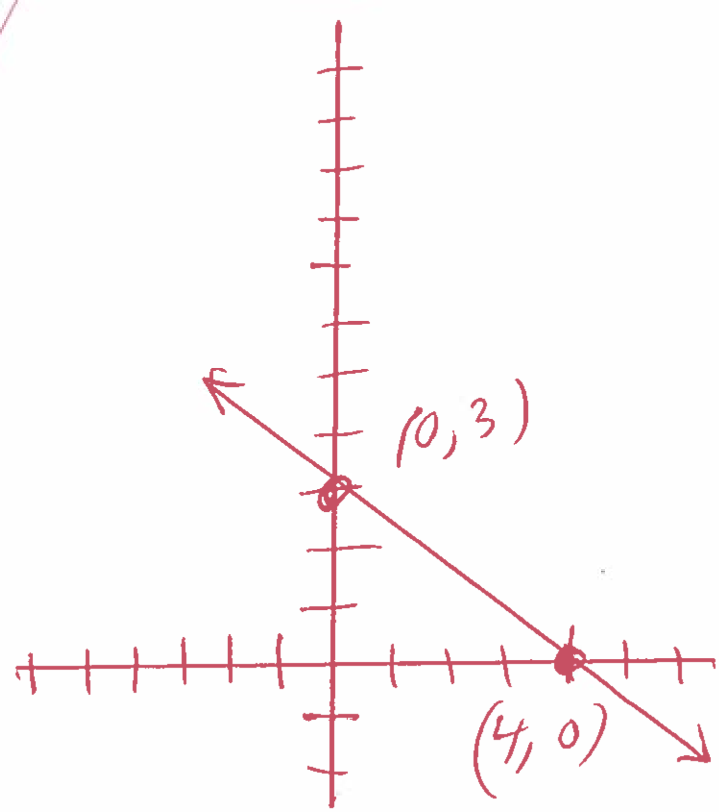
$3(0) + 4y = 12$

$0 + 4y = 12$

$4y = 12$

$\frac{\cancel{4}y}{\cancel{4}} = \frac{12}{4}$

$y = 3$



8) Find the intercepts and graph the equation by plotting points. 8

$18x^2+25y=450$

Find the x-intercept let $y=0$

$18x^2+25y=450$

$18x^2+25(0)=450$

$18x^2+0=450$

$18x^2=450$

$\frac{18x^2}{18}=\frac{450}{18}$

$x^2=25$

$\sqrt{x^2}=\pm\sqrt{25}$

$x=\pm 5$

$x=-5$ OR $x=5$

$(-5,0)$, $(5,0)$

Find the y-intercept let $x=0$

$18x^2+25y=450$

$18(0)^2+25y=450$

$18(0)(0)+25y=450$

$18(0)+25y=450$

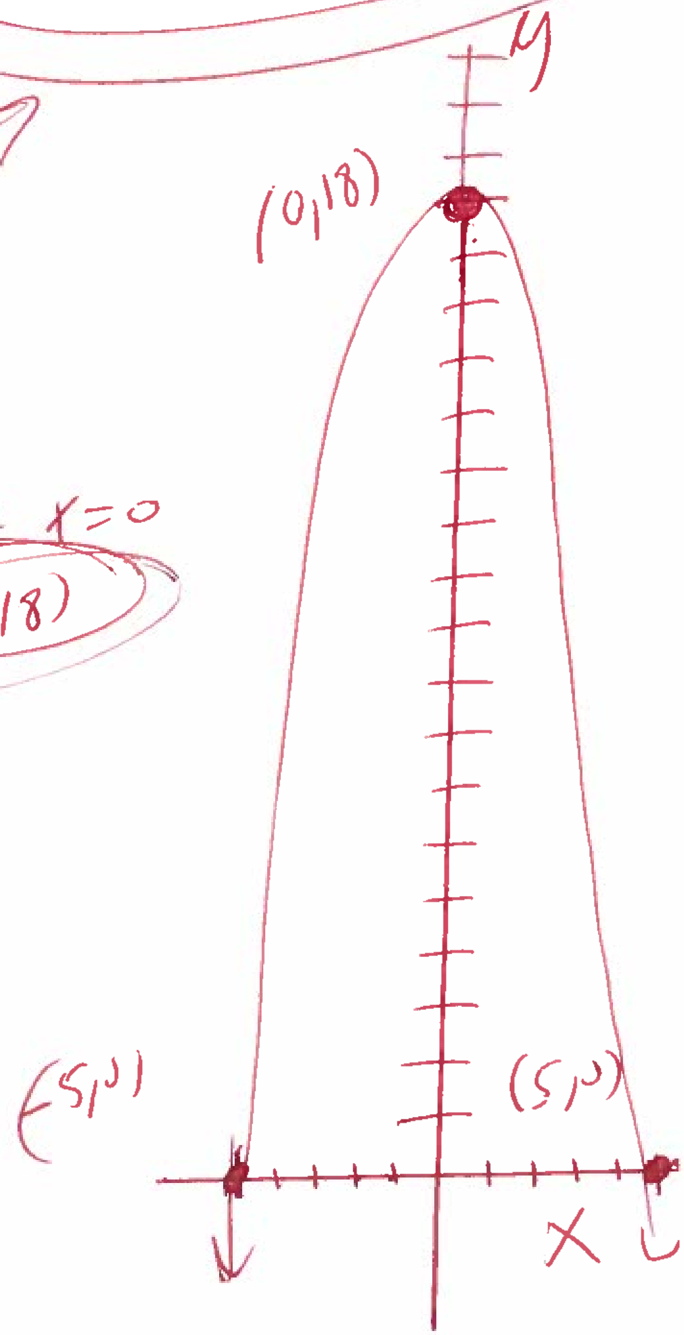
$0+25y=450$

$25y=450$

$\frac{25y}{25}=\frac{450}{25}$

$y=18$

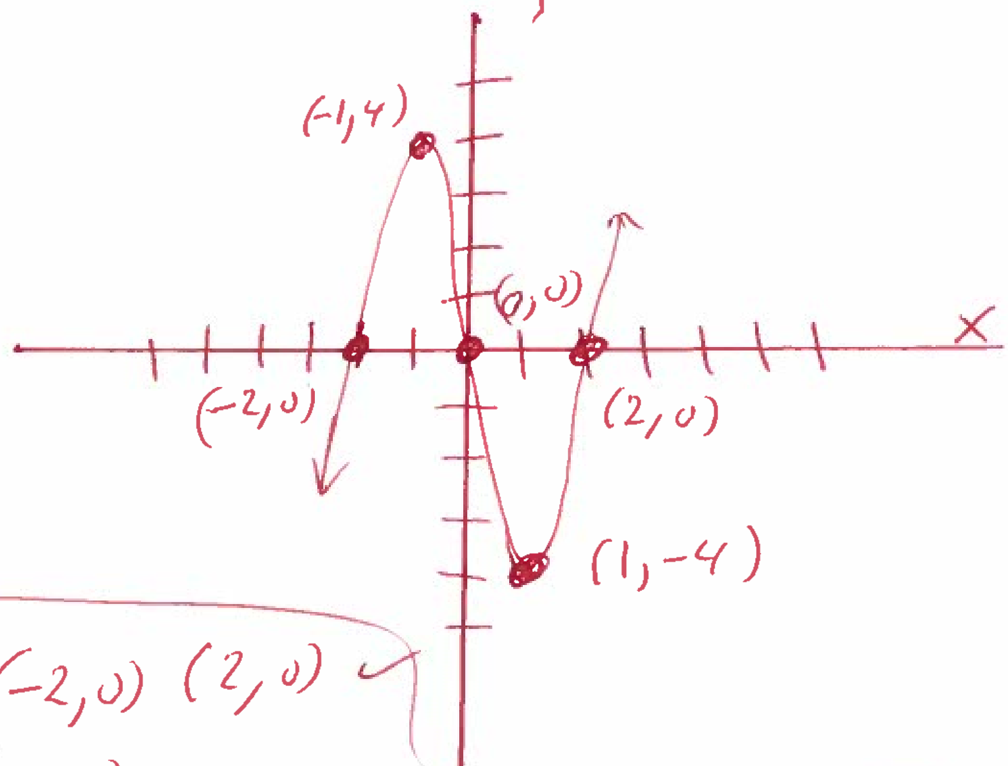
$(0,18)$



9 The graph of an equation is given (1)

a) Find the intercepts

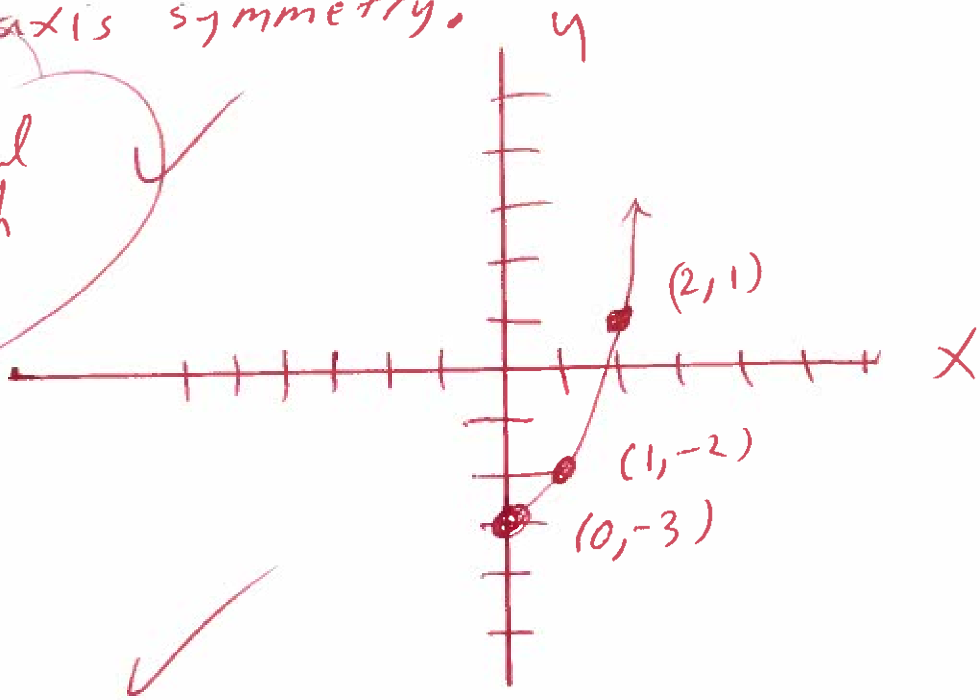
b) Indicate whether the graph is symmetric with respect to the x-axis, the y-axis, or the origin



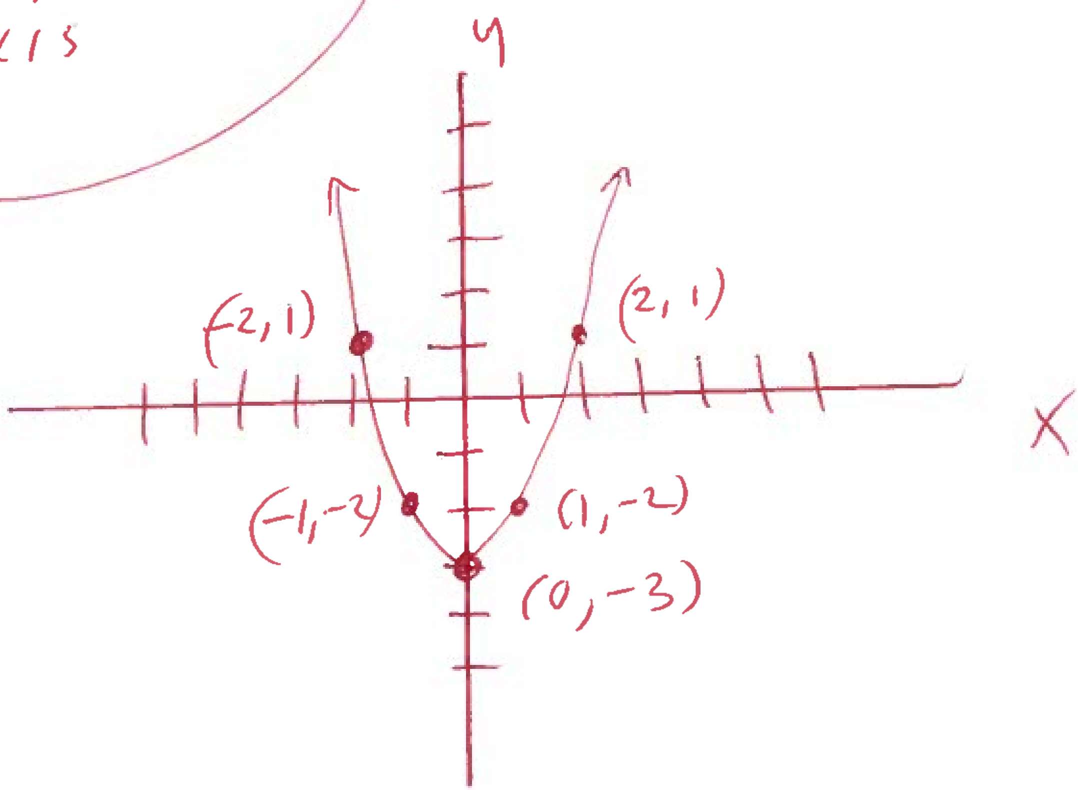
x-intercepts are (-2,0) (2,0) ✓
y-intercept is (0,0) ✓
The graph is symmetric with respect to the origin. ✓

10. Draw a complete graph so that it has y-axis symmetry. (10.)

original graph



new graph that is symmetric to y-axis



11. For the given equation, list the intercepts and test for symmetry. 11.

$y = x^3 - 125$

Find x-intercept let $y = 0$

$y = x^3 - 125$

$0 = x^3 - 125$

$0 + 125 = x^3 - 125 + 125$

$125 = x^3$

$\sqrt[3]{125} = \sqrt[3]{125}$

$5 = x$

$(5, 0)$

Find the y-intercept let $x = 0$

$y = x^3 - 125$

$(0, -125)$

$y = (0)^3 - 125$

$y = (0)(0)(0) - 125$

$y = 0 - 125$

$y = -125$

x intercept $(5, 0)$

y intercept $(0, -125)$

No, Not symmetric with respect to the x-axis.

No, not symmetric with respect to the y-axis.

No, not symmetric with respect to the origin.

12. For the given equation, list the intercepts and test for symmetry.

(12)

$y = x^2 - 2x - 8$

find x-intercepts let $y = 0$

$0 = x^2 - 2x - 8$

$0 = (x+2)(x-4)$

8·1, 2·4 possible

let $x+2=0$ OR $x-4=0$

$x+2-2=0-2$ OR $x-\cancel{4}+\cancel{4}=0+4$

$x=-2$ OR $x=4$

$(-2,0)$ $(4,0)$

find y-intercepts let $x=0$

$y = x^2 - 2x - 8$

$y = (0)^2 - 2(0) - 8$

$y = (0)(0) - 2(0) - 8$

$y = 0 - 0 - 8$

$y = -8$

$(0, -8)$

No, not symmetric with respect to the x-axis.
No, Not symmetric with respect to the y-axis
No, not symmetric with respect to the origin.

13. For the given equation, list the intercepts and test for symmetry. $y = \frac{-4x}{x^2+4}$ 13

find x-intercepts let $y=0$

$$y = \frac{-4x}{x^2+4}$$

$$\frac{0}{1} = \frac{-4x}{x^2+4}$$

$0(x^2+4) = 1(-4x)$ cross multiply

$$0 = -4x$$

$$\frac{0}{-4} = \frac{-4x}{-4}$$

$$0 = x$$

(0, 0)

find the y-intercept let $x=0$

$$y = \frac{-4x}{x^2+4}$$

$$y = \frac{-4(0)}{(0)^2+4}$$

$$y = \frac{0}{(0)(0)+4}$$

$$y = \frac{0}{0+4}$$

$$y = \frac{0}{4}$$

$$y = 0$$

(0, 0)

NO, NOT symmetric with respect to x-axis.
NO, NOT symmetric with respect to y-axis.
YES symmetric with respect to the origin.

(14.) List the intercepts and test for symmetry.

$$y = \frac{-6x^7}{x^2-16}$$

(14)

find x-intercept let $y=0$

$$y = \frac{-6x^7}{x^2-16}$$

$(0,0)$

$$\frac{0}{1} = \frac{-6x^7}{x^2-16}$$

$0(x^2-16) = 1(-6x^7)$ cross mult

$$0 = -6x^7$$

$$\frac{0}{-6} = \frac{\cancel{-6}x^7}{\cancel{-6}}$$

$$0 = x^7$$

$$\sqrt[7]{0} = \sqrt[7]{x^7}$$

$$0 = x$$

find the y-intercept let $x=0$

$(0,0)$

$$y = \frac{-6x^7}{x^2-16}$$

$$y = \frac{-6(0)^7}{(0)^2-16}$$

$$y = \frac{-6(0)^7}{(0)(0)-16}$$

$$y = \frac{-6(0)(0)(0)(0)(0)(0)(0)}{(0)(0)-16}$$

$$y = \frac{0}{0-16}$$

$$y = \frac{0}{-16}$$

$y=0$

The graph is symmetric with respect to the origin

15. List the intercepts and test for symmetry.

$y = \frac{-2x^3}{x^2-4}$

(15)

find x-intercept let $y=0$.

$(0,0)$

$y = \frac{-2x^3}{x^2-4}$

$\frac{0}{1} = \frac{-2x^3}{x^2-4}$

$0(x^2-4) = 1(-2x^3)$

$0 = -2x^3$

$\frac{0}{-2} = \frac{-2x^3}{-2}$

$0 = x^3$

$\sqrt[3]{0} = \sqrt[3]{x^3}$

$0 = x$

find the y-intercept let $x=0$.

$(0,0)$

$y = \frac{-2x^3}{x^2-4}$

$y = \frac{-2(0)^3}{(0)^2-4}$

$y = \frac{-2(0)(0)(0)}{(0)(0)-4}$

$y = \frac{0}{0-4}$

$y = \frac{0}{-4}$

$y = 0$

the graph is symmetric with respect to the origin

(16) Find the equation of the line that has point = (8, 1) and slope = 7, = m and Graph

$(8, 1)$ with $x_1 = 8$, $y_1 = 1$

x	y
8	1
9	8

(16)

$y - y_1 = m(x - x_1)$

$y - (1) = 7(x - (8))$

$y - 1 = 7(x - 8)$

$y - 1 = 7x - 56$

$y - \cancel{1} + \cancel{1} = 7x - 56 + 1$

$y = 7\cancel{x} - 55$

$y = 7(8) - 55$

$y = 56 - 55$

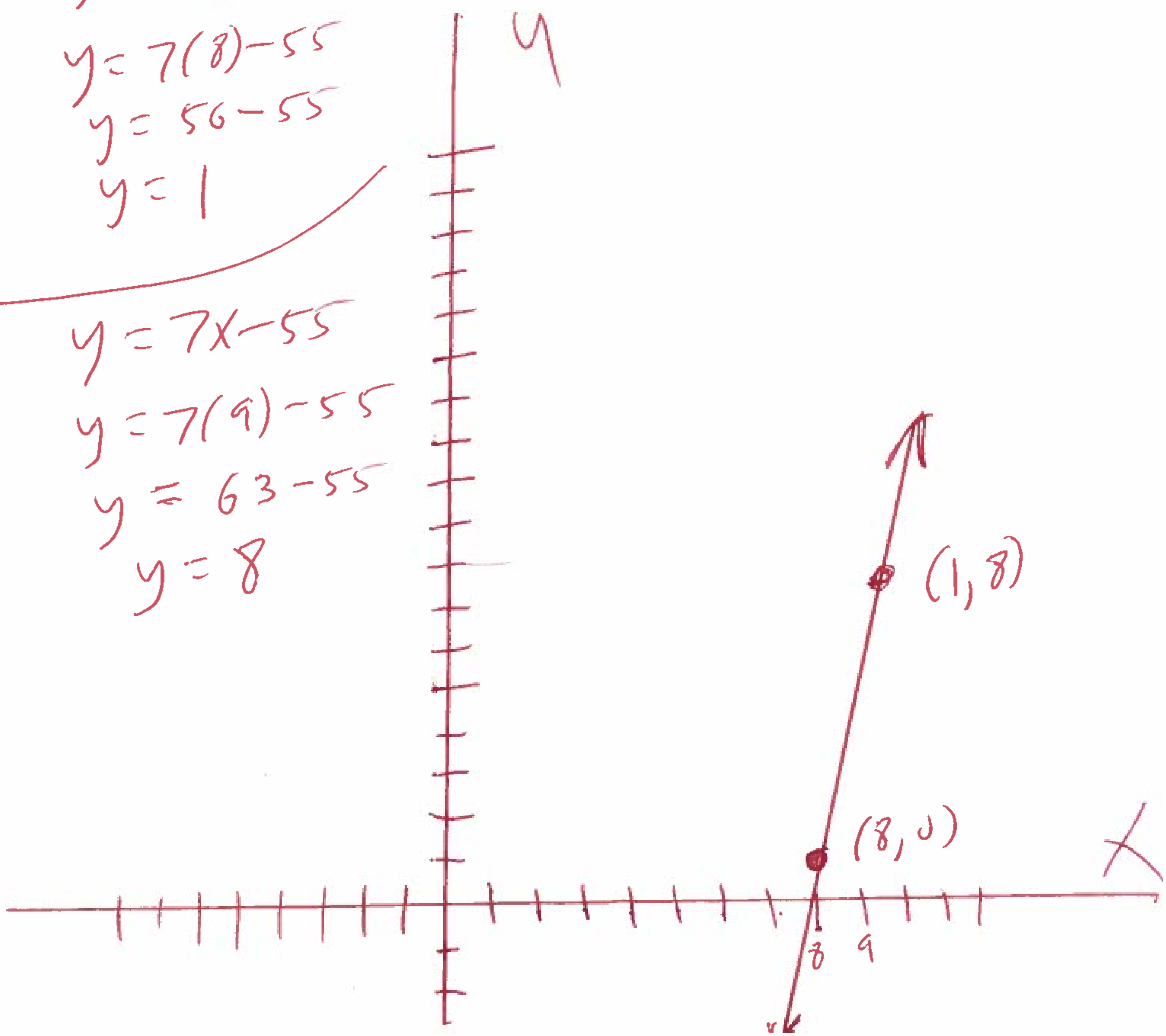
$y = 1$

$y = 7x - 55$

$y = 7(9) - 55$

$y = 63 - 55$

$y = 8$



17. Find the slope and y-intercept and graph

$y=3x+7$

$$y = \underset{\text{slope}}{m}x + \underset{\text{y-intercept}}{b}$$

(17)

Slope $= 3$

y-intercept $= 7$

x	y
0	7
1	10

$y = 3(0)+7$

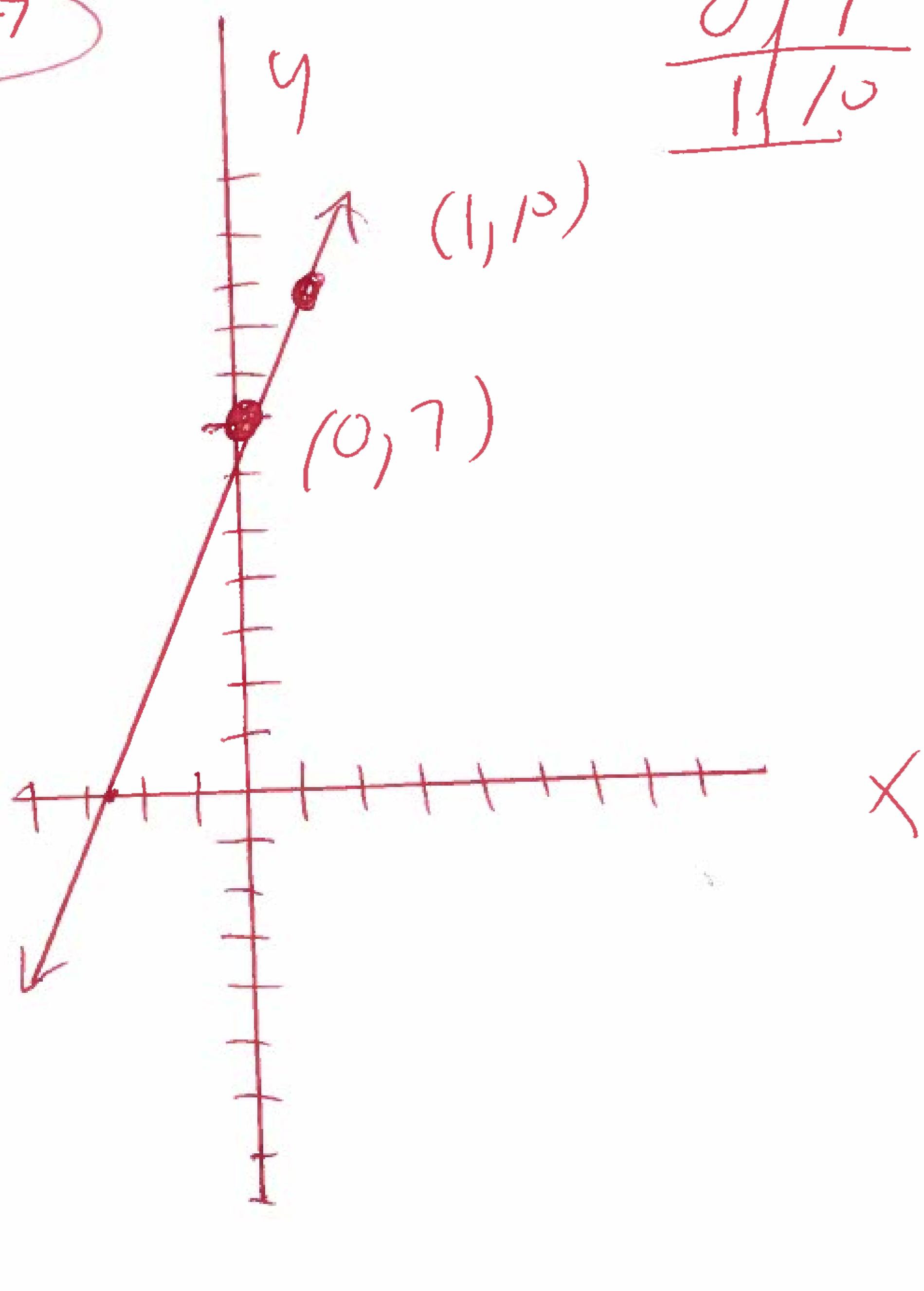
$y = 0+7$

$y = 7$

$y = 3(1)+7$

$y = 3+7$

$y = 10$



(18) Graph $x^2+y^2-2x-6y-26=0$ 18

$x^2-2x \quad + y^2-6y \quad = 26$ Complete the Square

$x^2-2x+(\frac{1}{2}(-2))^2+y^2-6y+(\frac{1}{2}(-6))^2=26+(\frac{1}{2}(-2))^2+(\frac{1}{2}(-6))^2$

$x^2-2x+(-1)^2+y^2-6y+(-3)^2=26+(-1)^2+(-3)^2$

$x^2-2x+1+y^2-6y+9=26+1+9$

$(x-1)(x-1)+(y-3)(y-3)=36$

$\boxed{(x-1)^2+(y-3)^2=36}$

Center $=(1,3)$ Radius $=\sqrt{36}=6$

Find x-intercept let $y=0$

$(x-1)^2+(0-3)^2=36$

$(x-1)^2+(-3)^2=36$

$(x-1)^2+9=36$

$(x-1)^2+\cancel{9}-\cancel{9}=36-9$

$(x-1)^2=27$

$\sqrt{(x-1)^2}=\pm\sqrt{27}$

$x-1=\pm\sqrt{9\cdot3}$

$x-1=\pm\sqrt{9}\sqrt{3}$

$x-1=\pm3\sqrt{3}$

$x=1\pm3\sqrt{3}$

x-intercepts

$(1+3\sqrt{3},0)$ $(1-3\sqrt{3},0)$

Find y-intercept let $x=0$

$(0-1)^2+(y-3)^2=36$

$(-1)^2+(y-3)^2=36$

$1+(y-3)^2=36$

$\cancel{1}+(y-3)^2-\cancel{1}=36-1$

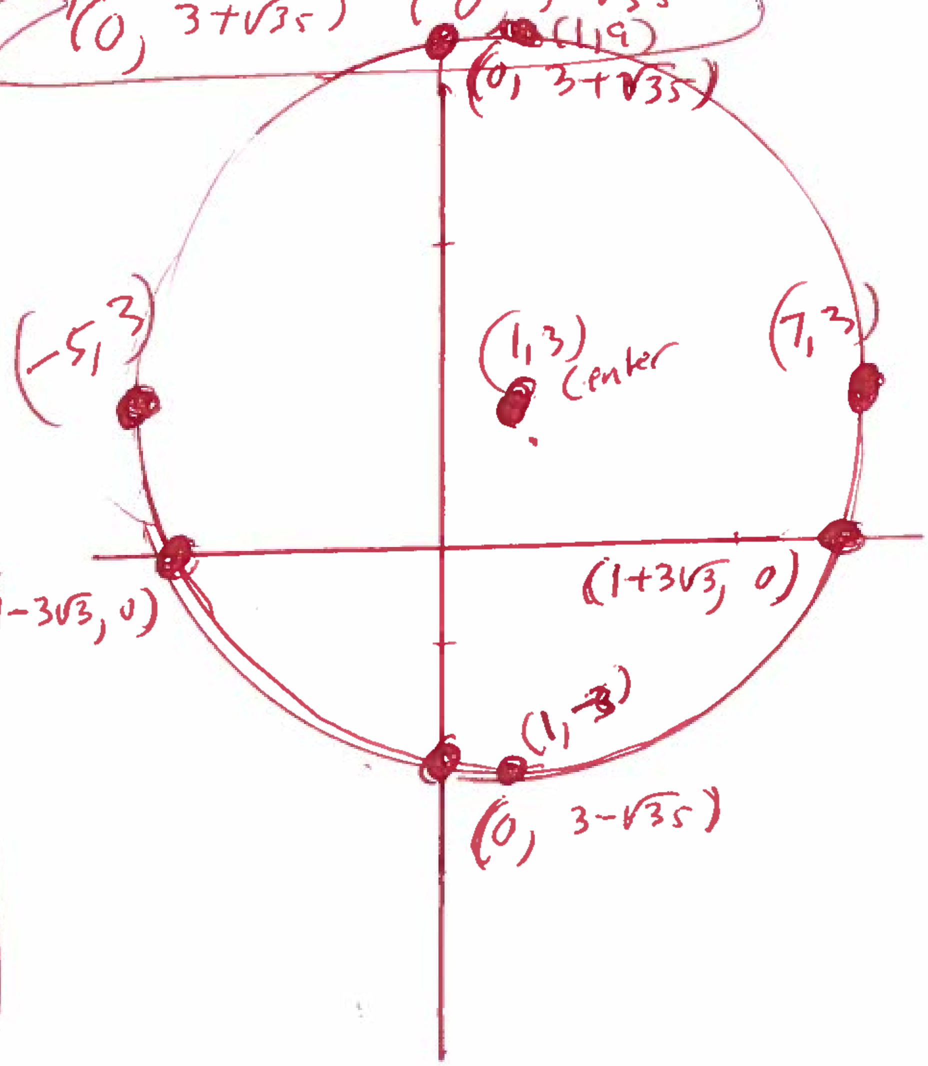
$(y-3)^2=35$

$\sqrt{(y-3)^2}=\pm\sqrt{35}$

$y-3=\pm\sqrt{35} \longrightarrow y=3\pm\sqrt{35}$

y-intercepts

$(0,3+\sqrt{35})$ $(0,3-\sqrt{35})$



19.

Solve

1

$9 - 3x < 3$

$\cancel{9} - 3x \cancel{- 9} < 3 - 9$

$-3x < -6$

$\frac{\cancel{-3}x}{\cancel{-3}} > \frac{-6}{-3}$

divide by a negative and turn the alligator around

$x > 2$

$(2, +\infty)$

20. To rationalize the denominator of $\frac{2}{\sqrt{3}+8}$ multiply the numerator and denominator by $\sqrt{3}-8$ ~~answer~~ 20.

ANSWER

Optional Example to work it out

$$\left(\frac{2}{\sqrt{3}+8}\right)\left(\frac{\sqrt{3}-8}{\sqrt{3}-8}\right) =$$

$$\frac{2\sqrt{3}-16}{(\sqrt{3})^2 - \cancel{8\sqrt{3}} + \cancel{8\sqrt{3}} - 64} =$$

$$\frac{2\sqrt{3}-16}{(\sqrt{3})^2 - 64} =$$

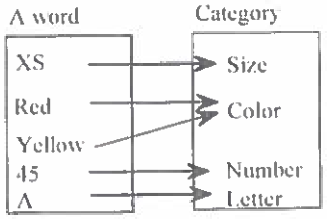
$$\frac{2\sqrt{3}-16}{3-64} =$$

OR $$\frac{2\sqrt{3}-16}{-61} =$$

OR $$\frac{2\sqrt{3}}{-61} - \frac{16}{-61} =$$

OR $$\frac{-2\sqrt{3}}{61} + \frac{16}{61} =$$

21. State the domain and range for the following relation. Then determine whether the relation represents a function.



21

Choose the correct answer below.

- Domain : {Red, Yellow}
  Range : {Color}
- Domain : {XS, Red, Yellow, 45, A}
  Range : {Size, Color, Number, Letter}
- Domain : {Size, Color, Number, Letter}
  Range : {XS, Red, Yellow, 45, A}
- Domain : {Size, Number, Letter}
  Range : {XS, 45, A}

Does the relation represent a function?

- **A.** No, because each element in the first set does not correspond to exactly one element in the second set.
- **B.** Yes, because each element in the first set corresponds to exactly one element in the second set.
- **C.** No, because an element in the second set corresponds to multiple elements in the first set.
- **D.** Yes, because each element in the second set corresponds to exactly one element in the first set.

22. State the domain and range for the following relation. Then determine whether the relation represents a function.

{(4,7), (−9,7), (9,10), (4,19)}

The domain of the relation is { −9, 4, 9 }.
(Use a comma to separate answers as needed.)

The range of the relation is { 7, 10, 19 }.
(Use a comma to separate answers as needed.)

22

Does the relation represent a function? Choose the correct answer below.

- A. The relation is a function because there are no ordered pairs with the same second element and different first elements.
- B. The relation is not a function because there are ordered pairs with 4 as the first element and different second elements.
- C. The relation is a function because there are no ordered pairs with the same first element and different second elements.
- D. The relation is not a function because there are ordered pairs with 10 as the second element and different first elements.

23. State the domain and range for the following relation. Then determine whether the relation represents a function.

$\{(-5,5), (-4,5), (-3,5), (-2,5)\}$

23.

The domain of the relation is {-5, -4, -3, -2}.
(Use a comma to separate answers as needed.)

The range of the relation is { 5 }.
(Use a comma to separate answers as needed.)

Does the relation represent a function? Choose the correct answer below.

- A. The relation is a function because there are no ordered pairs with the same first element and different second elements.
- B. The relation is not a function because there are ordered pairs with 5 as the second element and different first elements.
- C. The relation is a function because there are no ordered pairs with the same second element and different first elements.
- D. The relation is not a function because there are ordered pairs with -5 as the first element and different second elements.

24. State the domain and range for the following relation. Then determine whether the relation represents a function.

{(− 1,4), (0,3), (1,0), (2,3)}

24

The domain of the relation is {-1, 0, 1, 2}.
(Use a comma to separate answers as needed.)

The range of the relation is {0, 3, 4}.
(Use a comma to separate answers as needed.)

Does the relation represent a function? Choose the correct answer below.

- A. The relation is not a function because there are ordered pairs with − 1 as the first element and different second elements.
- B. The relation is a function because there are no ordered pairs with the same second element and different first elements.
- C. The relation is not a function because there are ordered pairs with 0 as the second element and different first elements.
- X D. The relation is a function because there are no ordered pairs with the same first element and different second elements.

25. Determine whether the equation defines y as a function of x.

$8x^2 + 3y^2 = 1$

Does the equation define y as a function of x?

- ◯ Yes
- ✗ No

25.

solve for y

$$8x^2 + 3y^2 = 1$$

$$\cancel{8x^2} + 3y^2 - \cancel{8x^2} = 1 - 8x^2$$

$$3y^2 = 1 - 8x^2$$

$$\frac{\cancel{3}y^2}{\cancel{3}} = \frac{1}{3} - \frac{8x^2}{3}$$

$$y^2 = \frac{1}{3} - \frac{8x^2}{3}$$

$$\sqrt{y^2} = \pm\sqrt{\frac{1}{3} - \frac{8x^2}{3}}$$

$$y = \pm\sqrt{\frac{1}{3} - \frac{8x^2}{3}}$$

$y = -\sqrt{\frac{1}{3} - \frac{8x^2}{3}}$ OR $y = +\sqrt{\frac{1}{3} - \frac{8x^2}{3}}$

NOT a function

26

26 $f(x) = 4x^2 + 2x - 4$

(a)

$f(0) = 4(0)^2 + 2(0) - 4$

$f(0) = 4(0)(0) + 2(0) - 4$

$f(0) = 0 + 0 - 4$

$f(0) = -4$

(b)

$f(3) = 4(3)^2 + 2(3) - 4$

$f(3) = 4(3)(3) + 2(3) - 4$

$f(3) = 36 + 6 - 4$

$f(3) = 42 - 4$

$f(3) = 38$

(c)

$f(-3) = 4(-3)^2 + 2(-3) - 4$

$f(-3) = 4(-3)(-3) + 2(-3) - 4$

$f(-3) = 36 - 6 - 4$

$f(-3) = 30 - 4$

$f(-3) = 26$

(d)

$f(-x) = 4(-x)^2 + 2(-x) - 4$

$f(-x) = 4(-x)(-x) + 2(-x) - 4$

$f(-x) = 4x^2 - 2x - 4$

(e)

$-f(x) =$

$-(4x^2 + 2x - 4) =$

$-4x^2 - 2x + 4 =$

(f)

$f(x+1) = 4(x+1)^2 + 2(x+1) - 4$

$f(x+1) = 4(x+1)(x+1) + 2(x+1) - 4$

$f(x+1) = 4(x^2 + x + x + 1) + 2(x+1) - 4$

$f(x+1) = 4(x^2 + 2x + 1) + 2(x+1) - 4$

$f(x+1) = 4x^2 + 8x + 4 + 2x + 2 - 4$

$f(x+1) = 4x^2 + 10x + 2$

(g)

$f(4x) = 4(4x)^2 + 2(4x) - 4$

$f(4x) = 4(4x)(4x) + 2(4x) - 4$

$f(4x) = 64x^2 + 8x - 4$

(h.)

$f(x+h) = 4(x+h)^2 + 2(x+h) - 4$

$f(x+h) = 4(x+h)(x+h) + 2(x+h) - 4$

$f(x+h) = 4(x^2 + xh + xh + h^2) + 2(x+h) - 4$

$f(x+h) = 4(x^2 + 2xh + h^2) + 2(x+h) - 4$

$f(x+h) = 4x^2 + 8xh + 4h^2 + 2x + 2h - 4$

27 $f(x) = \frac{6x+7}{2x-3}$

27

(a) $f(0) = \frac{6(0)+7}{2(0)-3}$

$f(0) = \frac{0+7}{0-3}$

$f(0) = -\frac{7}{3}$

(b) $f(1) = \frac{6(1)+7}{2(1)-3}$

$f(1) = \frac{6+7}{2-3}$

$f(1) = \frac{13}{-1}$

$f(1) = -13$

(c) $f(-1) = \frac{6(-1)+7}{2(-1)-3}$

$f(-1) = \frac{-6+7}{-2-3}$

$f(-1) = \frac{1}{-5}$

$f(-1) = -\frac{1}{5}$

(d) $f(-x) = \frac{6(-x)+7}{2(-x)-3}$

$f(-x) = \frac{-6x+7}{-2x-3}$

(e) $-f(x) =$

$-\left(\frac{6x+7}{2x-3}\right) =$

$-\frac{6x+7}{2x-3} =$

(f) $f(x+1) = \frac{6(x+1)+7}{2(x+1)-3}$

$f(x+1) = \frac{6x+6+7}{2x+2-3}$

$f(x+1) = \frac{6x+13}{2x-1}$

(g) $f(5x) = \frac{6(5x)+7}{2(5x)-3}$

$f(5x) = \frac{30x+7}{10x-3}$

(h) $f(x+h) = \frac{6(x+h)+7}{2(x+h)-3}$

$f(x+h) = \frac{6x+6h+7}{2x+2h-3}$

28. Find the domain of the function 28

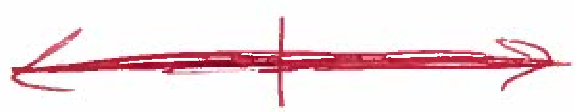
$f(x) = -3x + 4$

$(-\infty, \infty)$

OR

all real #s

OR



29. Find the domain of the function (29)

$$f(x) = \frac{x}{x^2+2}$$

? is $x^2+2=0$

$$x^2=-2$$

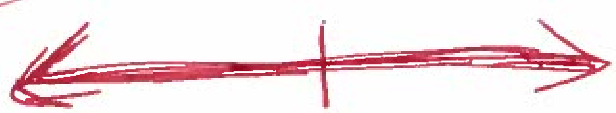
$$\sqrt{x^2} = \pm\sqrt{-2}$$

$$x = \pm\sqrt{2}\, i$$

$(-\infty, \infty)$

OR

all real #s



30. Find the domain of the function (4 pts)

$$g(x) = \frac{5x}{x^2-16}$$ Can not be zero

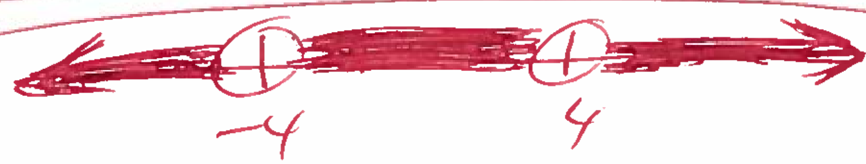
set $x^2-16=0$

$x^2=16$

$\sqrt{x^2}=\pm\sqrt{16}$

$x=\pm 4$

$x=-4$ OR $x=4$



OR

$(-\infty,-4)\cup(-4,4)\cup(4,\infty)$

$\{x \mid x\neq -4 \text{ or } x\neq 4\}$

31. Find the domain of the given function (31)

$$F(x) = \frac{x-12}{x^3+7x}$$ ← can not be zero

Set $x^3+7x=0$

$x(x^2+7)=0$

$x=0$ OR $x^2+7=0$

$x^2=-7$

$\sqrt{x^2} = \pm\sqrt{-7}$

$x = \pm\sqrt{7}\,i$

$x=-\sqrt{7}\,i$ OR $x=\sqrt{7}\,i$

OR

$(-\infty, 0) \cup (0, \infty)$

OR

$\{x \mid x<0 \text{ or } x>0\}$

32

Find the domain of the function

$f(x) = \sqrt{5x-45}$

Let $5x - 45 \geq 0$

$$5x - \cancel{45} + \cancel{45} \geq 0 + 45$$

$$5x \geq 45$$

$$\frac{\cancel{5}x}{\cancel{5}} \geq \frac{45}{5}$$

$$x \geq 9$$

$$[9, +\infty)$$

33 Find the domain of the function 33

$$p(x) = \sqrt{\frac{19}{x+7}}$$

$x+7 \neq 0$ and $x+7 > 0$

$x \neq -7$ and $x+\cancel{7}-\cancel{7} > 0-7$

$x > -7$

$(-7, +\infty)$

$\{x \mid x > -7\}$

34 Find the domain of the function 34

$$f(x) = \frac{2}{\sqrt{x+7}}$$

$x+7 \neq 0$ and $x+7 > 0$

$x+\cancel{7}-\cancel{7} > 0-7$

$x > -7$

OR

$x > -7$

OR

$\{x \mid x > -7\}$

OR

$(-7, +\infty)$

35 $f(x) = 5x+9$ and $g(x) = 9x-4$

2g.i

(a) $(f+g)(x) =$

$f(x)+g(x) =$

$(5x+9)+(9x-4) =$

$5x+9+9x-4 =$

$14x+5 =$ domain $(-\infty, \infty)$ ~~all real #~~

(b) $(f-g)(x) =$

$f(x)-g(x) =$

$(5x+9)-(9x-4) =$

$5x+9-9x+4 =$

$-4x+13 =$ domain $(-\infty, \infty)$ ~~all real #s~~

(c) $(f \cdot g)(x) =$

$f(x) \cdot g(x) =$

$(5x+9)(9x-4) =$

$45x^2-20x+81x-36 =$

$45x^2+61x-36 =$ domain $(-\infty, \infty)$ all real #s

(d) $\left(\frac{f}{g}\right)(x) =$

$\frac{f(x)}{g(x)} =$

$\frac{5x+9}{9x-4} =$

set $9x-4=0$

$9x-4+4=0+4$

$9x=4$

$\frac{9x}{9} = \frac{4}{9}$

$x = 4/9$

domain $\{x \mid x \neq \frac{4}{9}\}$

OR

$(-\infty, \frac{4}{9}) \cup (\frac{4}{9}, \infty)$

OR

$\frac{4}{9}$

(e) $(f+g)(x) = 14x+5$

$(f+g)(3) = 14(3)+5$

$(f+g)(3) = 42+5$

$(f+g)(3) = 47$

(f) $(f-g)(x) = -4x+13$

$(f-g)(2) = -4(2)+13$

$(f-g)(2) = -8+13$

$(f-g)(2) = 5$

(g) $(f \cdot g)(x) = 45x^2+61x-36$

$(f \cdot g)(4) = 45(4)^2+61(4)-36$

$(f \cdot g)(4) = 45(4)(4)+61(4)-36$

$(f \cdot g)(4) = 720+244-36$

$(f \cdot g)(4) = 964-36$

$(f \cdot g)(4) = 928$

(h) $\left(\frac{f}{g}\right)(x) = \frac{5x+9}{9x-4}$

$\left(\frac{f}{g}\right)(1) = \frac{5(1)+9}{9(1)-4}$

$\left(\frac{f}{g}\right)(1) = \frac{5+9}{9-4}$

$\left(\frac{f}{g}\right)(1) = \frac{14}{5}$

36 find $\frac{f(x+h)-f(x)}{h}$

36

$f(x)=2x+5$

$$\frac{f(x+h)-f(x)}{h}=$$

$$\frac{(2(x+h)+5)-(2x+5)}{h}=$$

$$\frac{\cancel{2x}+2h+\cancel{5}-\cancel{2x}-\cancel{5}}{h}=$$

$$\frac{2h}{h}=$$

$$2=$$

37 find $\frac{f(x+h)-f(x)}{h}$ 37

$f(x)=x^2+4$

$\frac{f(x+h)-f(x)}{h}=$

$\frac{((x+h)^2+4)-(x^2+4)}{h}=$

$\frac{(x+h)(x+h)+4-x^2-4}{h}=$

$\frac{x^2+xh+xh+h^2+4-x^2-4}{h}=$

$\frac{\cancel{x^2}+2xh+h^2+\cancel{4}-\cancel{x^2}-\cancel{4}}{h}=$

$\frac{2xh+h^2}{h}=$

$\frac{2x\cancel{h}}{\cancel{h}}+\frac{h^2}{h}=$

$2x+h=$

38. Find $\dfrac{f(x+h) - f(x)}{h}$

38.

$$f(x) = x^2 - 3x + 2$$

$$\frac{f(x+h) - f(x)}{h} =$$

$$\frac{((x+h)^2 - 3(x+h) + 2) - (x^2 - 3x + 2)}{h} =$$

$$\frac{(x+h)(x+h) - 3x - 3h + 2 - x^2 + 3x - 2}{h} =$$

$$\frac{x^2 + xh + xh + h^2 - 3x - 3h + 2 - x^2 + 3x - 2}{h} =$$

$$\frac{\cancel{x^2} + 2xh + h^2 - \cancel{3x} - 3h + \cancel{2} - \cancel{x^2} + \cancel{3x} - \cancel{2}}{h} =$$

$$\frac{2xh + h^2 - 3h}{h} =$$

$$\frac{3x\cancel{h}}{\cancel{h}} + \frac{h^2}{h} - \frac{3\cancel{h}}{\cancel{h}} =$$

$$3x + h - 3 =$$

39) find $\dfrac{f(x+h)-f(x)}{h}$ (39)

$f(x)=\sqrt{x-16}$

$$\frac{f(x+h)-f(x)}{h}=$$

$$\frac{\left(\sqrt{(x+h)-16}\right)-\left(\sqrt{x-16}\right)}{h}=$$

$$\frac{\sqrt{x+h-16}-\sqrt{x-16}}{h}=$$

$$\left(\frac{\sqrt{x+h-16}-\sqrt{x-16}}{h}\right)\frac{\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}{\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}$$

$$\frac{\left(\sqrt{x+h-16}\right)^2+\cancel{\sqrt{x+h-16}\sqrt{x-16}}-\cancel{\sqrt{x+h-16}\sqrt{x-16}}-\left(\sqrt{x-16}\right)^2}{h\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}$$

$$\frac{\left(\sqrt{x+h-16}\right)^2-\left(\sqrt{x-16}\right)^2}{h\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}=$$

$$\frac{(x+h-16)-(x-16)}{h\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}=$$

$$\frac{\cancel{x}+h-\cancel{16}-\cancel{x}+\cancel{16}}{h\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}=$$

$$\frac{\cancel{h}}{\cancel{h}\left(\sqrt{x+h-16}+\sqrt{x-16}\right)}=$$

$$\frac{1}{\sqrt{x+h-16}+\sqrt{x-16}}$$

40. Given $f(x) = x^2 - 2x + 4$ find the values for x such that $f(x) = 39$

40.

$$39 = f(x) = x^2 - 2x + 4$$

$$39 = x^2 - 2x + 4$$

$$\cancel{39} - \cancel{39} = x^2 - 2x + 4 - 39$$

$$0 = x^2 - 2x - 35$$

$$0 = (x+5)(x-7)$$

Possibly

35 · 1

7 · 5

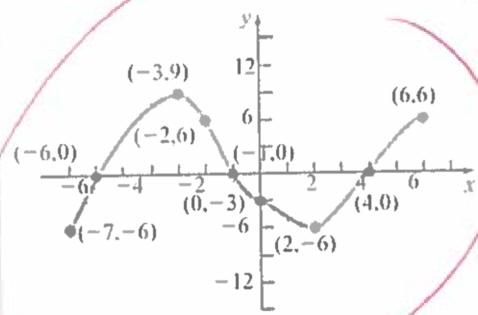
set $x + 5 = 0$ or $x - 7 = 0$

$x + 5 - 5 = 0 - 5$ or $x - \cancel{7} + \cancel{7} = 0 + 7$

$x = -5$ or $x = 7$

41

41. Use the graph of the function f shown to the right to answer parts (a)-(n).



(a) Find f(− 7) and f(− 2).

f(− 7) = −6

f(− 2) = 6

(b) Find f(6) and f(0).

f(6) = 6

f(0) = −3

(c) Is f(2) positive or negative?

- Positive
- X Negative

(d) Is f(− 3) positive or negative?

- X Positive
- Negative

(e) For what value(s) of x is f(x) = 0?

x = −6, −1, 4

(Use a comma to separate answers as needed.)

(f) For what values of x is f(x) > 0?

$-6 < x < -1$, $4 < x \le 6$

(Type a compound inequality. Use a comma to separate answers as needed.)

(g) What is the domain of f?

The domain of f is {x| $-7 \le x \le 6$ }.

(Type a compound inequality.)

(h) What is the range of f?

The range of f is {y| $-6 \le y \le 9$ }.

(Type a compound inequality.)

(i) What are the x-intercept(s)?

x = −6, −1, 4

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

(j) What are the y-intercept(s)?

y = −3

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

(k) How often does the line y = 1 intersect the graph?

3 time(s)

math1414eliz

(l) How often does the line x = 2 intersect the graph?

1 time(s)

(m) For what value(s) of x does f(x) = − 6?

x = −7, 2

(Use a comma to separate answers as needed.)

(n) For what value(s) of x does f(x) = 9?

x = −3

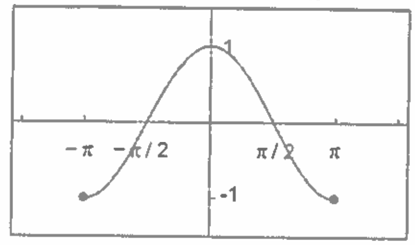
(Use a comma to separate answers as needed.)

42. Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find

(a) its domain and range.

(b) the intercepts, if any.

(c) any symmetry with respect to the x-axis, y-axis, or the origin.



(42)

Is the graph that of a function?

- [x] Yes
- [ ] No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

- [x] **A.** The domain is $[-\pi, \pi]$. The range is $[-1, 1]$
  (Type your answers in interval notation.)
- [ ] **B.** The graph is not a function.

What are the intercepts? Select the correct choice below and fill in any answer boxes within your choice.

- [x] **A.** The intercepts are $(\frac{\pi}{2}, 0)$, $(-\frac{\pi}{2}, 0)$ $(0, 1)$
  (Type an ordered pair. Type an exact answer using π as needed. Use a comma to separate answers as needed.)
- [ ] **B.** There are no intercepts.
- [ ] **C.** The graph is not a function.

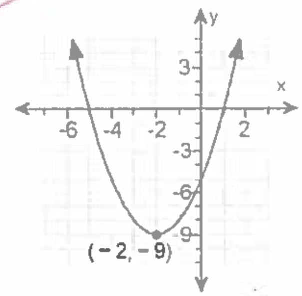
Determine if the graph is symmetrical.

- [ ] **A.** It is symmetrical with respect to the x-axis.
- [x] **B.** It is symmetrical with respect to the y-axis.
- [ ] **C.** It is symmetrical with respect to the origin.
- [ ] **D.** The graph is not symmetrical.
- [ ] **E.** The graph is not a function.

0

43\. Determine whether the graph is ~~that of a~~ function by using the vertical-line test. ~~If it is~~, use the graph to find:

(a) The domain and range
(b) The intercepts, if any
(c) Any symmetry with respect to the x-axis, the y-axis, or the origin



43

Is the graph that of a function?

- [x] Yes
- [ ] No

(a) If the graph is that of a function, what are its domain and range? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- [x] A. The domain is $(-\infty, \infty)$. The range is $[-9, \infty)$.
  (Type your answers in interval notation.)
- [ ] B. The graph is not a function.

(b) If the graph is that of a function, what are its intercepts? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- [x] A. The intercepts are $(1,0)\ (-5,0)\ (0,-5)$
  (Type an ordered pair. Use a comma to separate answers as needed.)
- [ ] B. There are no intercepts.
- [ ] C. The graph is not a function.

(c) If the graph is that of a function, determine what kinds of symmetry it has. Select all that apply.

- [ ] A. It is symmetric with respect to the x-axis.
- [ ] B. It is symmetric with respect to the origin.
- [ ] C. It is symmetric with respect to the y-axis.
- [x] D. The graph is not symmetric with respect to the x-axis, y-axis, or the origin.
- [ ] E. The graph is not a function.

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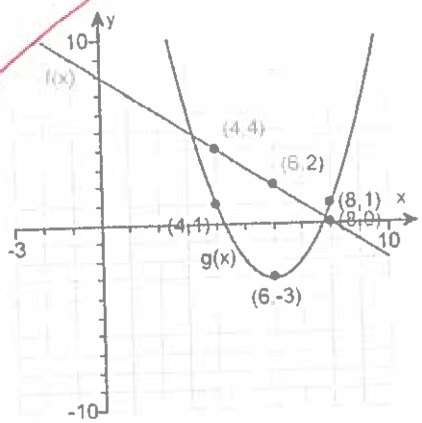
44. The graph of two functions, f and g, is illustrated below. Use the graph to answer parts (a) through (f).



(a) $(f+g)(4) =$ 5
(Simplify your answer.)

(b) $(f+g)(6) =$ -1
(Simplify your answer.)

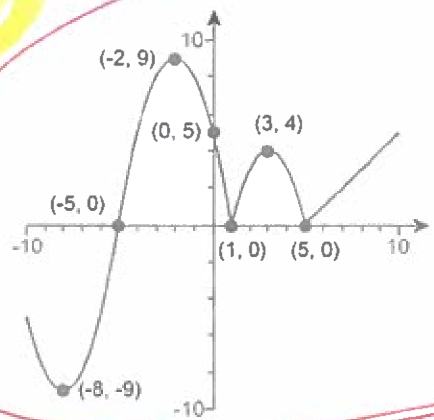
(c) $(f-g)(8) =$ -1
(Simplify your answer.)

(d) $(g-f)(8) =$ 1
(Simplify your answer.)

(e) $(f \cdot g)(4) =$ 4
(Simplify your answer.)

(f) $\left(\frac{f}{g}\right)(6) =$ $-\frac{2}{3}$
(Simplify your answer.)

45. Use the graph of the function f given below to answer the question.

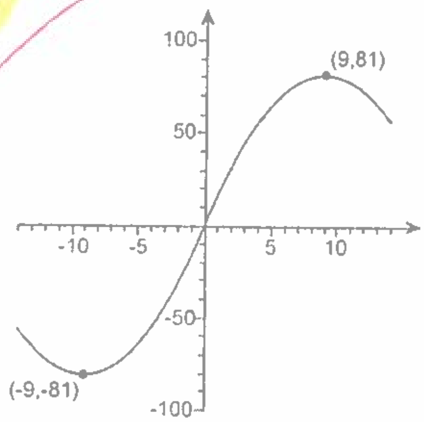


Is f strictly decreasing on the interval $(-2, 0)$?

- [x] Yes
- [ ] No

45.

46. List the intervals on which f is increasing.

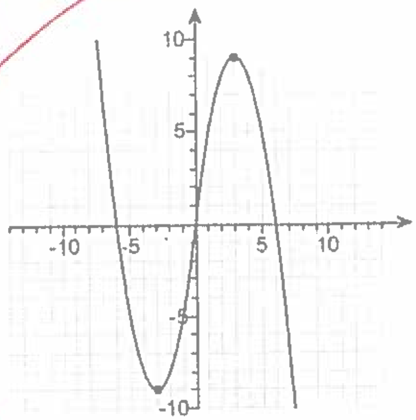


(-9, 9)

(Type your answer in interval notation. Use a comma to separate answers as needed.)

46.

47. Use the graph of the function f given below to answer the questions.



Is there a local minimum at $x = -3$?

- Yes
- No

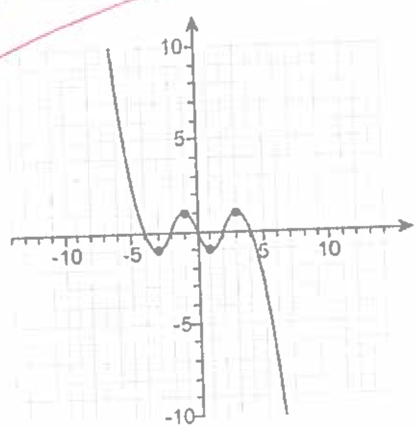
If there is a local minimum at $x = -3$, what is it? Select the correct choice below and fill in any answer boxes within your choice.

A. The local minimum is y = -9.
(Type an integer.)

B. There is no local minimum at $x = -3$.

47

48. Use the graph of the function f given below to answer the questions.



List the values of x at which f has a local minimum. Select the correct choice below and fill in any answer boxes within your choice.

A. x = −3, 1
(Type an integer. Use a comma to separate answers as needed.)

B. There are no local minima.

48

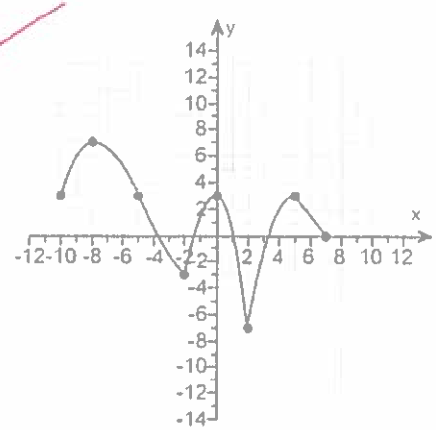
What are these local minima, if they exist? Select the correct choice below and fill in any answer boxes within your choice.

A. The local minima are −1, −1.
(Type an integer. Use a comma to separate answers as needed.)

B. There are no local minima.

49. Find the absolute maximum of f on [− 10,7].

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

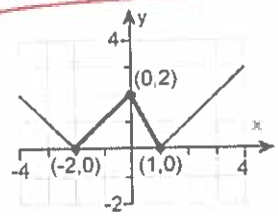


A. The absolute maximum of f is f(−8) = 7 .
(Type integers or fractions.)

B. There is no absolute maximum.

(49)

50.



Use the graph to find:

(a) The numbers, if any, at which f has a local maximum. What are these local maxima?
(b) The numbers, if any, at which f has a local minimum. What are these local minima?

(a) Select the correct choice below and fill in any answer boxes within your choice.

50

- **A.** The value(s) of x at which f has a local maximum is/are x = 0.
  (Type an integer. Use a comma to separate answers as needed.)
- **B.** There are no values of x at which f has a local maximum.

Select the correct choice below and fill in any answer boxes within your choice.

- **A.** The local maxima is/are y = 2.
  (Type an integer. Use a comma to separate answers as needed.)
- **B.** There are no local maxima.

(b) Select the correct choice below and fill in any answer boxes within your choice.

- **A.** The value(s) of x at which f has a local minimum is/are x = -2, 1.
  (Type an integer. Use a comma to separate answers as needed.)
- **B.** There are no values of x at which f has a local minimum.

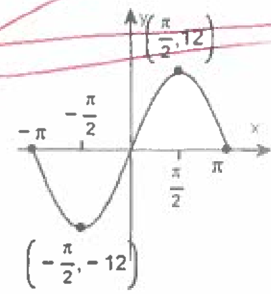
Select the correct choice below and fill in any answer boxes within your choice.

- **A.** The local minima is/are y = 0, 0.
  (Type an integer. Use a comma to separate answers as needed.)
- **B.** There are no local minima.

51. Using the given graph of the function f, find the following.

(a) The numbers, if any, at which f has a local maximum. What are these local maxima?

(b) The numbers, if any, at which f has a local minimum. What are these local minima?



(a) Find the value(s) of x at which f has a local maximum. Select the correct choice below and fill in any answer boxes in your choice.

A. x = $\frac{\pi}{2}$

(Type an exact answer, using π as needed. Use a comma to separate answers as needed.)

B. There is no solution.

Find the local maximum. Select the correct choice below and fill in any answer boxes in your choice.

A. 12

(Type an exact answer, using π as needed. Use a comma to separate answers as needed.)

B. There is no solution.

(b) Find the value(s) of x at which f has a local minimum. Select the correct choice below and fill in any answer boxes in your choice.

A. x = $-\frac{\pi}{2}$

(Type an exact answer, using π as needed. Use a comma to separate answers as needed.)

B. There is no solution.

Find the local minimum. Select the correct choice below and fill in any answer boxes in your choice.

A. -12

(Type an exact answer, using π as needed. Use a comma to separate answers as needed.)

B. There is no solution.

51.

52. Determine algebraically whether the given function is even, odd, or neither

52.

$f(x) = 9x^3$

$f(-x) = 9(-x)^3$

$f(-x) = 9(-x)(-x)(-x)$

$f(-x) = 9(-x^3)$

$f(-x) = -9x^3$

$f(-x) = -(9x^3)$

$f(-x) = -(f(x))$ Subs

$f(-x) = -f(x)$

odd

(53) Determine algebraically whether the given function is even, odd, or neither.

(53)

$g(x) = 8x^2 - 3$

$g(-x) = 8(-x)^2 - 3$

$g(-x) = 8(-x)(-x) - 3$

$g(-x) = 8(x^2) - 3$

$g(-x) = 8x^2 - 3$

$g(-x) = g(x)$ subst

even

54 find the average rate of change of $f(x)=-3x^2+6$

54.

a) from 1 to 3

$$\frac{f(3)-f(1)}{3-1}=$$

$$\frac{(-3(3)^2+6)-(-3(1)^2+6)}{3-1}=$$

$$\frac{(-3(3)(3)+6)-(-3(1)(1)+6)}{3-1}=$$

$$\frac{(-27+6)-(-3+6)}{3-1}=$$

$$\frac{(-21)-(3)}{3-1}=$$

$$\frac{-21-3}{3-1}=$$

$$\frac{-24}{2}=$$

$$-12=$$

b) from 3 to 5

$$\frac{f(5)-f(3)}{5-3}=$$

$$\frac{(-3(5)^2+6)-(-3(3)^2+6)}{5-3}=$$

$$\frac{(-3(5)(5)+6)-(-3(3)(3)+6)}{5-3}=$$

$$\frac{(-75+6)-(-27+6)}{5-3}=$$

$$\frac{(-69)-(-21)}{5-3}=$$

$$\frac{-69+21}{5-3}=\frac{-48}{2}=-24$$

c) from 1 to 4.

$$\frac{f(4)-f(1)}{4-1}=$$

$$\frac{(-3(4)^2+6)-(-3(1)^2+6)}{4-1}=$$

$$\frac{(-3(4)(4)+6)-(-3(1)(1)+6)}{4-1}=$$

$$\frac{(-48+6)-(-3+6)}{4-1}=$$

$$\frac{(-42)-(3)}{4-1}=$$

$$\frac{-42-3}{4-1}=$$

$$\frac{-45}{3}=$$

$$-15=$$

55. Let $f(x) = 9x - 1$

(a) Find the average rate of change from 5 to 7.

55.

$$\frac{f(7) - f(5)}{7-5} =$$

$$\frac{(9(7)-1) - (9(5)-1)}{7-5} =$$

$$\frac{(63-1) - (45-1)}{7-5} =$$

$$\frac{(62) - (44)}{7-5} =$$

$$\frac{62 - 44}{7-5} =$$

$$\frac{18}{2} =$$

$$9 =$$

(b) Find an equation of the secant line containing $(5, f(5))$ and $(7, f(7))$.

$f(5) = 9(5) - 1$ $(5, 44)$

$f(5) = 45 - 1$

$f(5) = 44$

$f(7) = 9(7) - 1$

$f(7) = 63 - 1$ $(7, 62)$

$f(7) = 62$

$m = 9$ $\underset{x_1}{(7,} \underset{y_1}{62)}$

$y - y_1 = m(x - x_1)$

$y - (62) = 9(x - (7))$

$y - 62 = 9(x - 7)$

$y - 62 = 9x - 63$

$y - 62 + 62 = 9x - 63 + 62$

$y = 9x - 1$

56. Find the average rate of change from -5 to 4.

56.

a) $f(x) = 8x^2 - 4$

$$\frac{f(4) - f(-5)}{(4) - (-5)} =$$

$$\frac{(8(4)^2 - 4) - (8(-5)^2 - 4)}{(4) - (-5)} =$$

$$\frac{(8(4)(4) - 4) - (8(-5)(-5) - 4)}{4 - (-5)} =$$

$$\frac{(128 - 4) - (200 - 4)}{4 - (-5)} =$$

$$\frac{(124) - (196)}{4 - (-5)} =$$

$$\frac{124 - 196}{4 + 5} =$$

$$\frac{-72}{9} =$$

$$-8 =$$

b) ~~Find the~~ equation of the secant line containing $(-5, f(-5))$ and $(4, f(4))$

$f(4) = 8(4)^2 - 4$

$f(4) = 8(4)(4) - 4$

$f(4) = 128 - 4$

$f(4) = 124$

$(4, 124)$

$x_1 \quad y_1$

$m = -8$

$y - y_1 = m(x - x_1)$

$y - (124) = -8(x - (4))$

$y - 124 = -8(x - 4)$

$y - 124 = -8x + 32$

$y \cancel{- 124} \cancel{+ 124} = -8x + 32 + 124$

$y = -8x + 156$

57. Let $h(x) = x^2 - 7x$ 57.

a) Find the average rate of change from 6 to 8.

$$\frac{h(8)-h(6)}{8-6} =$$

$$\frac{((8)^2-7(8))-((6)^2-7(6))}{8-6} =$$

$$\frac{((8)(8)-7(8))-((6)(6)-7(6))}{8-6} =$$

$$\frac{(64-56)-(36-42)}{8-6} =$$

$$\frac{(8)-(-6)}{8-6} =$$

$$\frac{8+6}{8-6} =$$

$$\frac{14}{2} =$$

$$7 =$$

b.) Find an equation of the secant line containing $(6, h(6))$ and $(8, h(8))$.

$h(8) = (8)^2 - 7(8)$

$h(8) = (8)(8) - 7(8)$

$h(8) = 64 - 56$

$h(8) = 8$

$(8, 8)$

$x_1\ y_1$

$m = 7$

$y - y_1 = m(x - x_1)$

$y - (8) = 7(x - (8))$

$y - 8 = 7(x - 8)$

$y - 8 = 7x - 56$

$y - \cancel{8} + \cancel{8} = 7x - 56 + 8$

$y = 7x - 48$

58. $g(x) = x^3 - 27x$

(a) Determine whether g is even, odd, or neither

58.

$g(-x) = (-x)^3 - 27(-x)$

$g(-x) = (-x)(-x)(-x) - 27(-x)$

$g(-x) = -x^3 + 27x$

$g(-x) = -1(x^3 - 27x)$

$g(-x) = -g(x)$ Subst

Odd

(b) there is a local minimum of -54 at 3

$(3, -54)$.

Determine the local maximum.

$(-3, 54)$

max $= 54$

Use graphing calculator

$y_1 = x^3 - 27x$

59. Which of the following functions has a graph that is symmetric about the y-axis?

Select all that apply.

- ☐ A. $y = \sqrt{x}$
- ☒ B. $y = |x|$
- ☐ C. $y = \frac{1}{x}$
- ☐ D. $y = x^3$

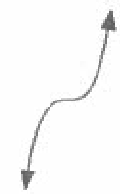
59

use graphing calculator

y_1 = math num abs (X)

60. Match the graph given to the right to its function.

69



Choose the correct answer below.

- ○ Absolute value function
- ○ Reciprocal function
- ○ Square function
- ○ Constant function
- ○ Identity function
- ○ Cube function
- ○ Cube root function
- ○ Square root function

Example graph

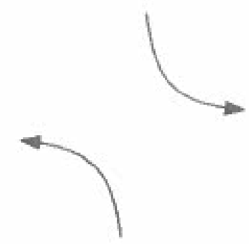
use graphing calculator

$y_1 = x^3$

math1414eliz

61.

61. Match the graph given to the right to its function.



Choose the correct answer below.

- Cube root function
- Square root function
- Constant function
- Cube function
- Identity function
- Absolute value function
- Reciprocal function
- Square function

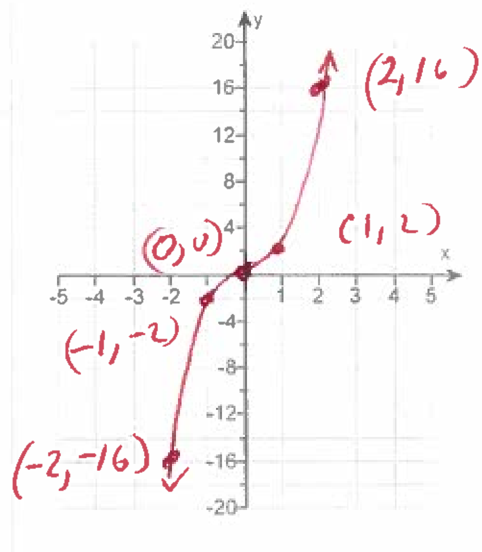
Example graph (use graphing calculator)

$y_1 = 1/x$

62. Sketch the graph of the given function.

$f(x) = 2x^3$

Use the graphing tool to graph the equation.



62

Use graphing calculator

$y_1 = 2x \wedge 3$

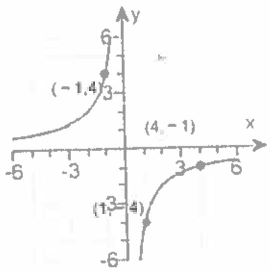
63.

63. Sketch the graph of the function. Be sure to label three points on the graph.

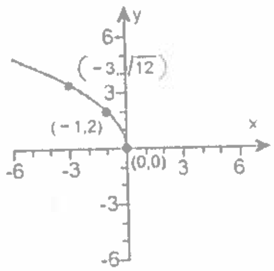
$$f(x) = \frac{4}{x}$$

Choose the correct graph below.

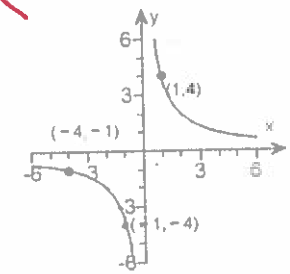
A.



B.



C.



Use graphing calculator

$y_1 = 4/x$

math1414eliz

64.

64. If $f(x) = \begin{cases} 3x-1 & \text{if } -3 \le x \le 2 \\ x^3-2 & \text{if } 2 < x \le 3 \end{cases}$, find: (a) f(0), (b) f(1), (c) f(2), and (d) f(3).

(a) f(0) = -1

(b) f(1) = 2

(c) f(2) = 5

(d) f(3) = 25

$f(0) = 3(0)-1 = 0-1 = -1$

$f(1) = 3(1)-1 = 3-1 = 2$

$f(2) = 3(2)-1 = 6-1 = 5$

$f(3) = (3)^3-2 = (3)(3)(3)-2 = 27-2 = 25$

65. The function f is defined as follows.

$$f(x) = \begin{cases} x & \text{if } x \neq 0 \\ 3 & \text{if } x = 0 \end{cases}$$

(65.)

(a) Find the domain of the function.
(b) Locate any intercepts.
(c) Graph the function.
(d) Based on the graph, find the range.
(e) Is f continuous on its domain?

(a) The domain of the function f is $(-\infty, \infty)$
(Type your answer in interval notation.)

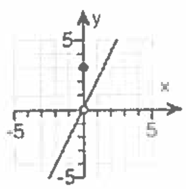
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

X **A.** The intercept(s) is/are (0,3).
(Type an ordered pair. Use a comma to separate answers as needed.)

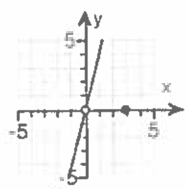
○ **B.** There are no intercepts.

(c) Choose the correct graph below.

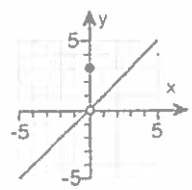
○ **A.**



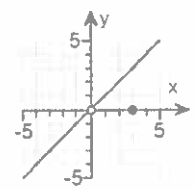
○ **B.**



X **C.**



○ **D.**



(d) The range of the function f is $(-\infty, 0) \cup (0, \infty)$.
(Type your answer in interval notation.)

(e) Is f continuous on its domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

X **A.** No, f is discontinuous at x = 0.
(Use a comma to separate answers as needed.)

○ **B.** Yes, f is continuous on its domain.

66. The function f is defined as follows

66.

$$f(x)=\begin{cases} -2x+3 & \text{if } x<1 \\ 4x-3 & \text{if } x\geq 1 \end{cases}$$

(a) Find the domain of the function. $(-\infty, \infty)$

(b) Locate any intercepts.

Find y-intercept let $x=0$

$f(x)=-2x+3$

$f(0)=-2(0)+3$

$f(0)=0+3$ $\quad (0,3)$

$f(0)=3$

$f(x)=-2x+3$

$f(0)=-2(0)+3$

$f(0)=0+3$

$f(0)=3$

x	y
0	3
1	1

$f(x)=4x-3$

$f(1)=4(1)-3$

$f(1)=4-3$

$f(1)=1$

x	y
1	1
2	5

$f(1)=-2(1)+3$

$f(1)=-2+3$

$f(1)=1$

$f(2)=4(2)-3$

$f(2)=8-3$

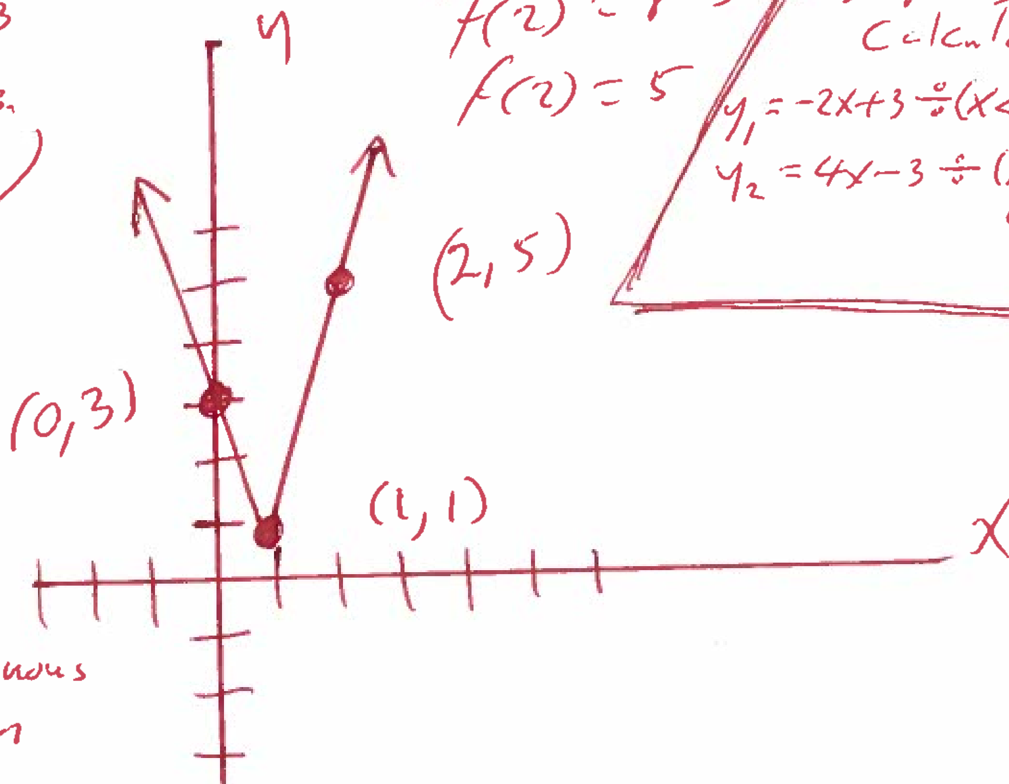
$f(2)=5$

OR use graphing calculator

$y_1=-2x+3 \div (x<1)$ open

$y_2=4x-3 \div (x\geq 1)$ close

(c) graph



(d) range (Bottom, Top)

$[1, +\infty)$

(e) f is continuous on its domain

67

67. The function f is defined as follows.

$$f(x) = \begin{cases} x+3 & \text{if } -2 \le x < 1 \\ 7 & \text{if } x = 1 \\ -x+2 & \text{if } x > 1 \end{cases}$$

(a) Find the domain of the function.
(b) Locate any intercepts.
(c) Graph the function.
(d) Based on the graph, find the range.
(e) Is f continuous on its domain?

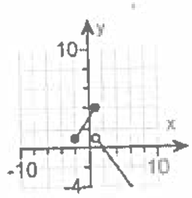
(a) The domain of the function f is $[-2, \infty)$
(Type your answer in interval notation.)

(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

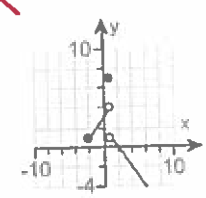
- A. The intercept(s) is/are $(0,3), (2,0)$
  (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

(c) Choose the correct graph below.

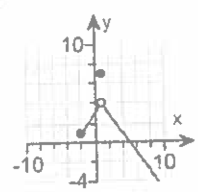
A.



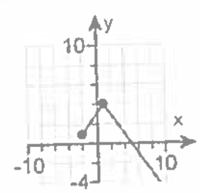
B.



C.



D.



(d) The range of the function f is $(-\infty, 4) \cup \{7\}$
(Type your answer in interval notation.)

(e) Is f continuous on its domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. No, f is discontinuous at x = 1.
  (Use a comma to separate answers as needed.)
- B. Yes, f is continuous on its domain.

68. The function f is defined as follows

68.

$$f(x) = \begin{cases} 2+x & \text{if } x<0 \quad \text{OPEN} \\ x^2 & \text{if } x \geq 0 \quad \text{close} \end{cases}$$

(a) find the domain. $(-\infty, \infty)$

(b) Locate any intercepts

$y = 2+x$ Find x-intercept let $y=0$

$0 = 2+x$

$0-2 = \cancel{2}+x-\cancel{x}$

$-2 = x$

$(-2, 0)$

$y = x^2$ Find y-intercept let $x=0$

$y = (0)^2$

$y = (0)(0)$

$y = 0$

$(0, 0)$

(d) Find range

$(-\infty, \infty)$

(e) Is f continuous on its domain

NO

$$\boxed{\begin{array}{l} \text{Use Graphing Calculator} \\ Y_1 = 2+x \div (X<0) \text{ OPEN} \\ Y_2 = x^2 \div (X \geq 0) \text{ Close} \end{array}}$$

$f(x) = 2+x$

x	y
−1	1
0	2

$f(-1) = 2+(-1)$

$f(-1) = 2-1$

$f(-1) = 1$

$f(0) = 2+0$

$f(0) = 2$

$f(x) = x^2$

x	y
0	0
1	1
2	4

$f(0) = (0)^2$

$f(0) = (0)(0)$

$f(0) = 0$

$f(1) = (1)^2$

$f(1) = (1)(1)$

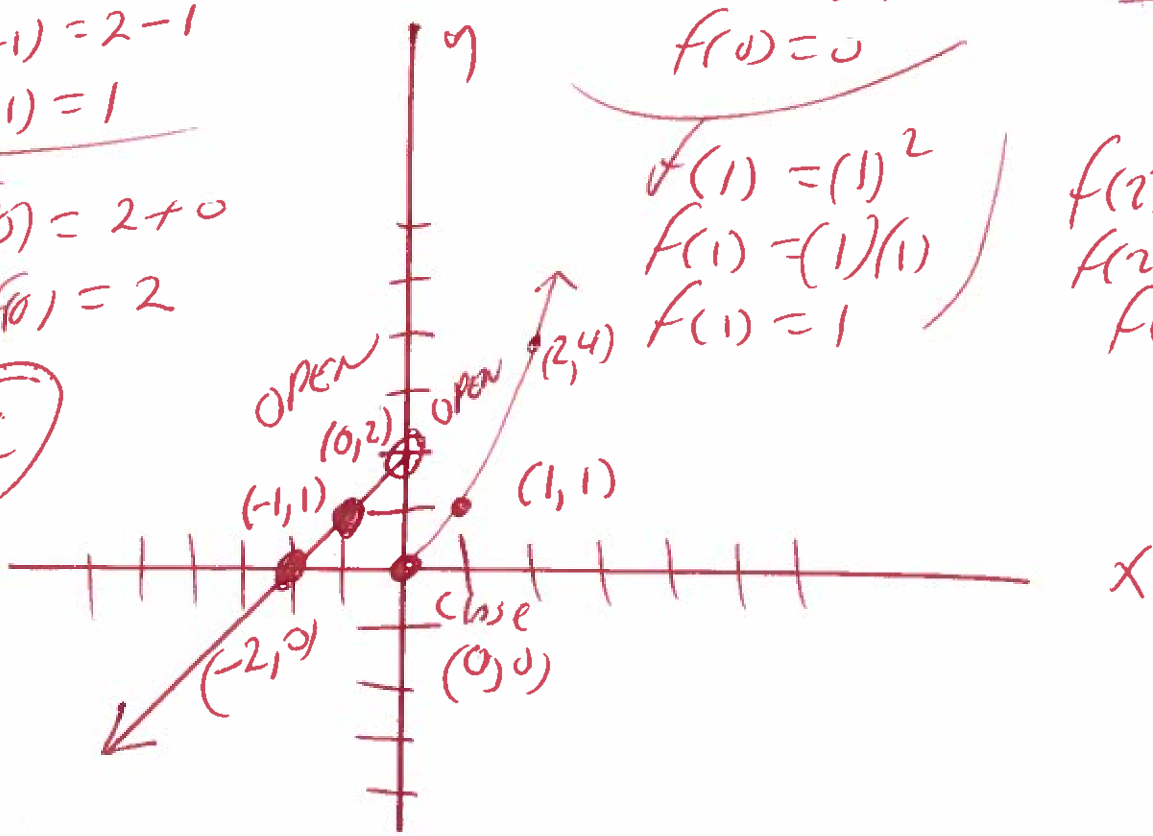
$f(1) = 1$

$f(2) = (2)^2$

$f(2) = (2)(2)$

$f(2) = 4$

(c)



69 Graph

$y = -x^2 + 5$

$y = -(-1)^2 + 5$

$y = -(-1)(-1) + 5$

$y = -(1) + 5$

$y = -1 + 5$

$y = 4$

$y = -(0)^2 + 5$

$y = -(0)(0) + 5$

$y = -(0) + 5$

$y = 0 + 5$

$y = 5$

$y = -(1)^2 + 5$

$y = -(1)(1) + 5$

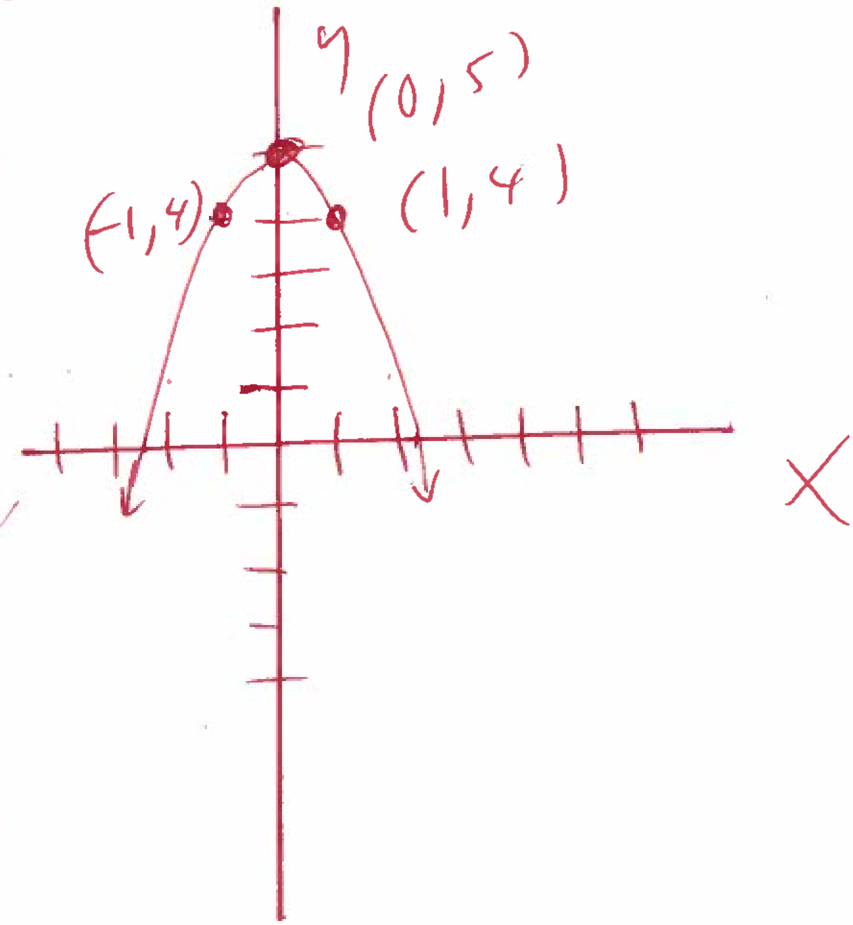
$y = -(1) + 5$

$y = -1 + 5$

$y = 4$

x	y
-1	4
0	5
1	4

69



Use Graphing Calculator

$Y_1 = -X^\wedge 2 + 5$

70 graph

$y = -|x+3|$

x	y
-4	-1
-3	0
-2	-1

70.

$y = -|-4+3|$

$y = -|-1|$

$y = -(1)$

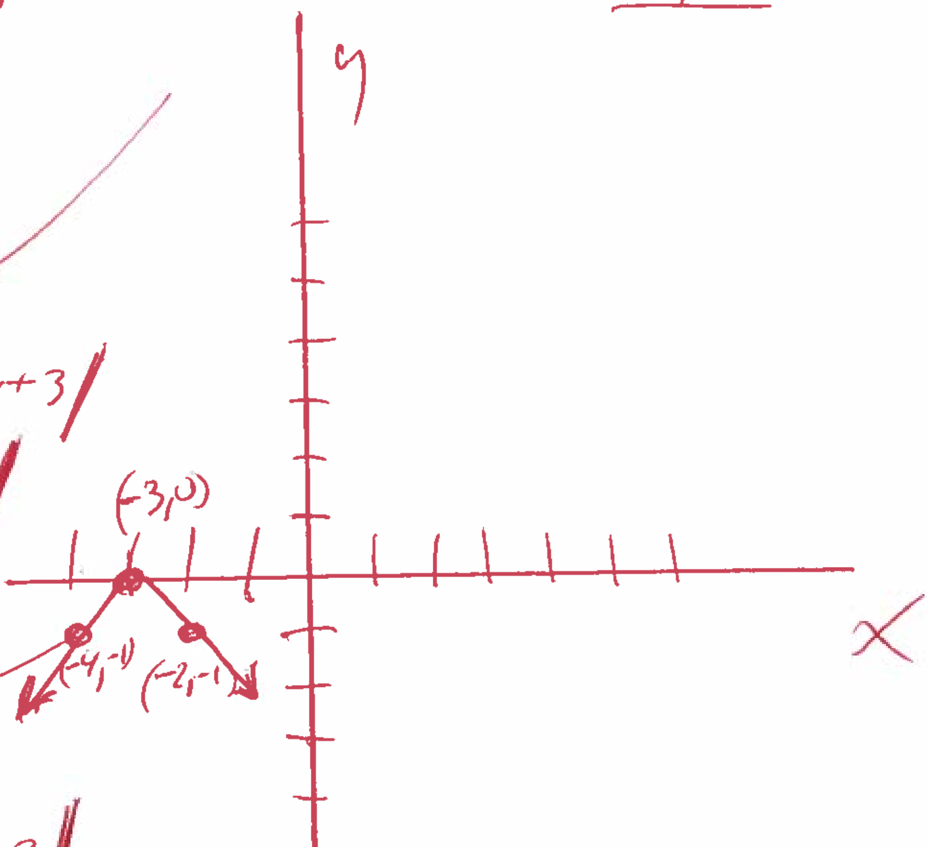
$y = -1$

$y = -|-3+3|$

$y = -|0|$

$y = -(0)$

$y = 0$



$y = -|-2+3|$

$y = -|1|$

$y = -(1)$

$y = -1$

Use graphing Calculator

$Y_1 = \overset{\text{Little}}{-}$ math num abs $(X+3)$

71 Graph

$y = 2x^2$

$y = 2(-1)^2$

$y = 2(-1)(-1)$

$y = 2(1)$

$y = 2$

$y = 2(0)^2$

$y = 2(0)(0)$

$y = 2(0)$

$y = 0$

$y = 2(1)^2$

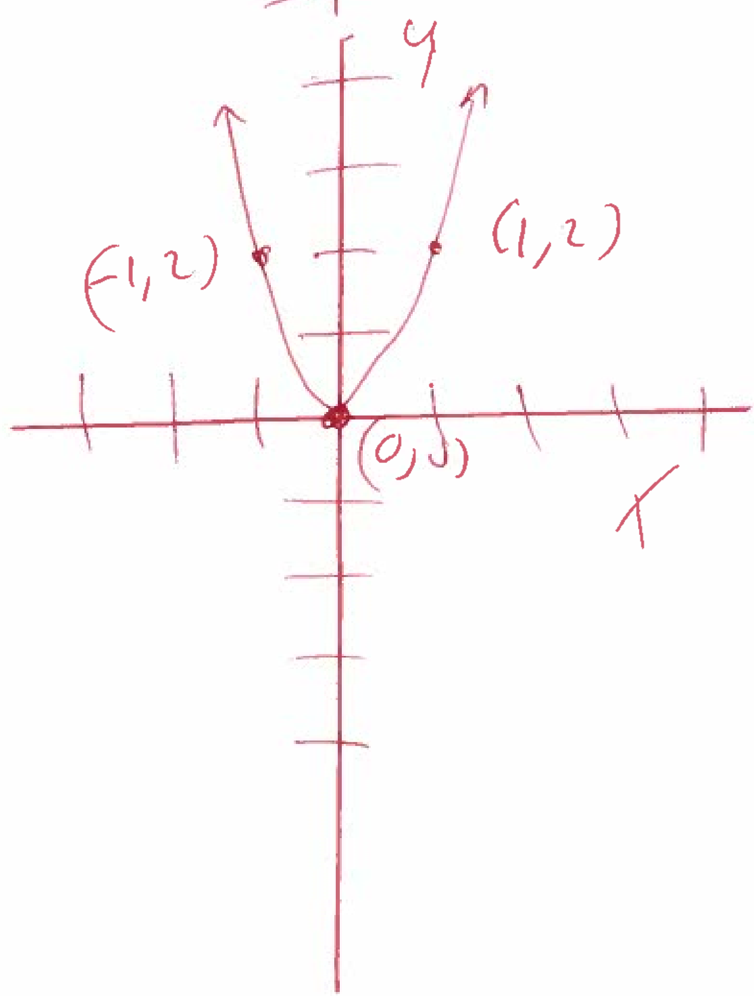
$y = 2(1)(1)$

$y = 2(1)$

$y = 2$

x	y
-1	2
0	0
1	2

71



use graphing calculator

$y_1 = 2x^2$

72. Graph

$y = |x-3|$

$y = |2-3|$

$y = |-1|$

$y = 1$

$y = |3-3|$

$y = |0|$

$y = 0$

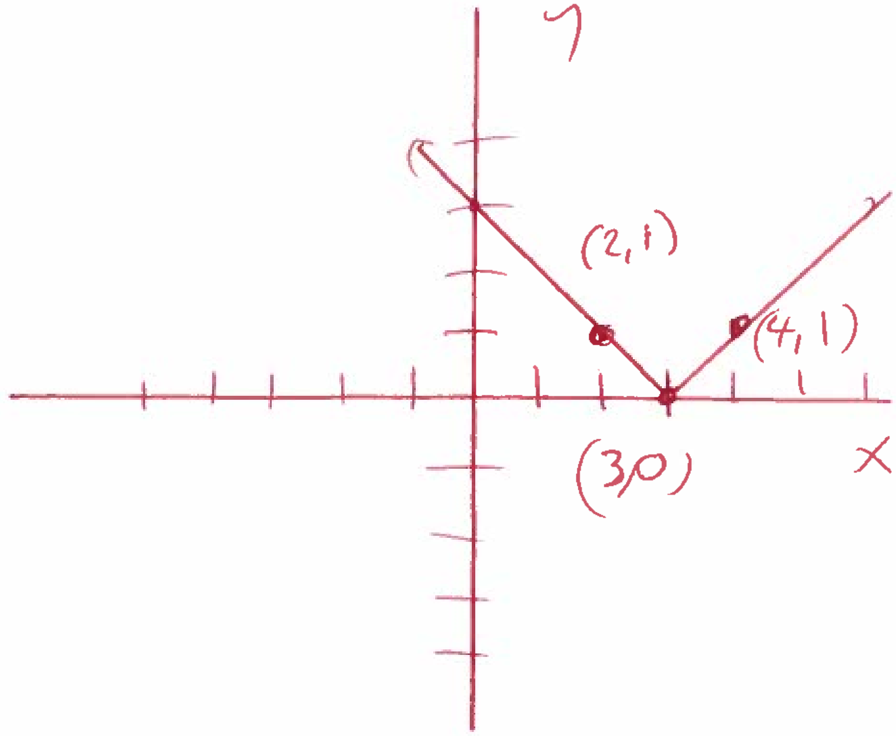
$y = |4-3|$

$y = |1|$

$y = 1$

x	y
2	1
3	0
4	1

72.



Use a graphing calculator

y_1 = math num abs

$y_1 = abs(x-3)$

73 Graph

$g(x) = x^3 + 6$

$g(-2) = (-2)^3 + 6$

$g(-2) = (-2)(-2)(-2) + 6$

$g(-2) = -8 + 6$

$g(-2) = -2$

$g(-1) = (-1)^3 + 6$

$g(-1) = (-1)(-1)(-1) + 6$

$g(-1) = -1 + 6$

$g(-1) = 5$

$g(0) = (0)^3 + 6$

$g(0) = (0)(0)(0) + 6$

$g(0) = 0 + 6$

$g(0) = 6$

$g(1) = (1)^3 + 6$

$g(1) = (1)(1)(1) + 6$

$g(1) = 1 + 6$

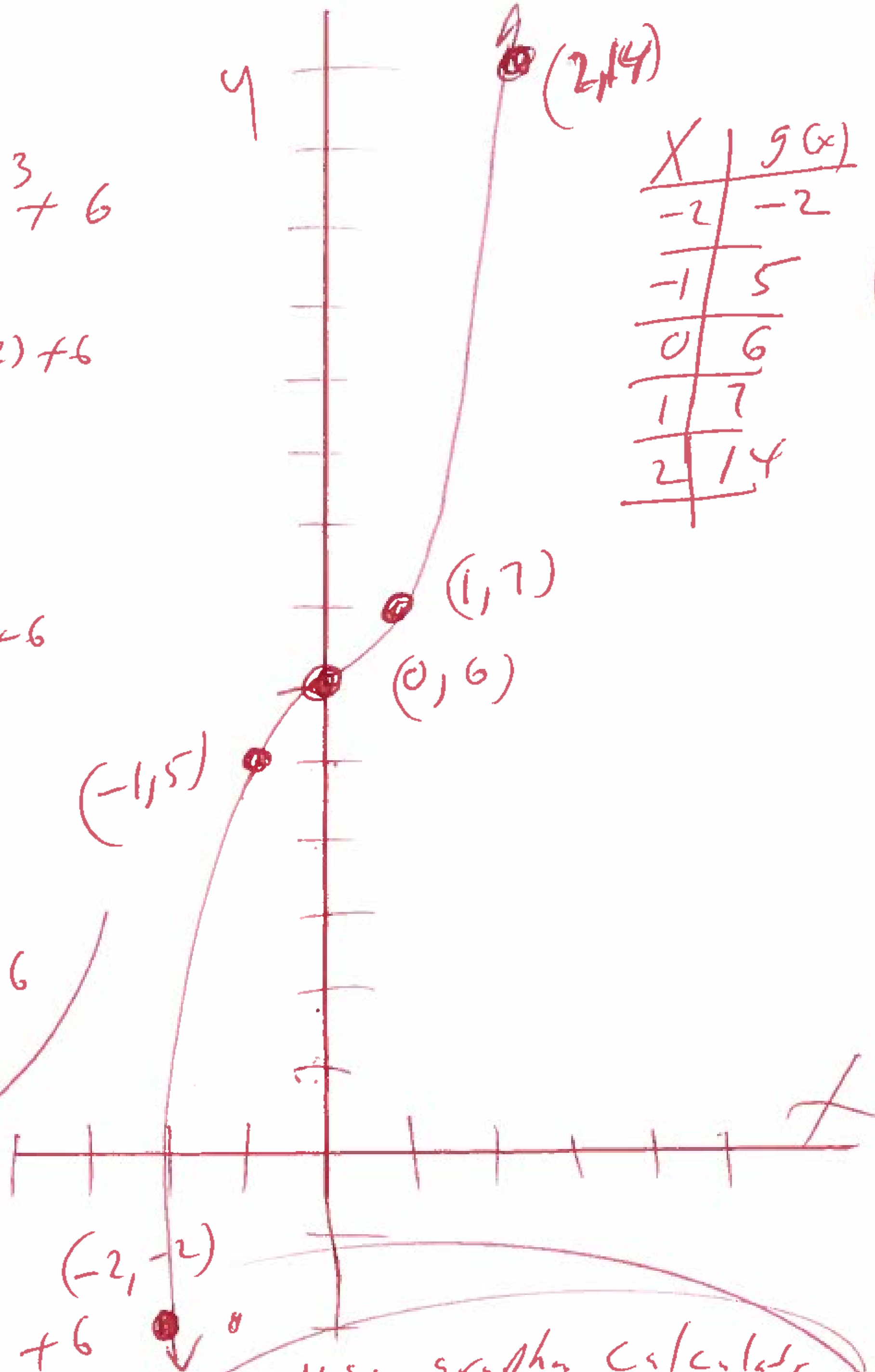
$g(1) = 7$

$g(2) = (2)^3 + 6$

$g(2) = (2)(2)(2) + 6$

$g(2) = 8 + 6$

$g(2) = 14$



X	g(x)
-2	-2
-1	5
0	6
1	7
2	14

73

use graphing calculator

$y_1 = x^3 + 6$

74 Graph

$h(x) = \sqrt{x+3}$

$h(-3) = \sqrt{-3+3}$

$h(-3) = \sqrt{0}$

$h(-3) = 0$

$h(-2) = \sqrt{-2+3}$

$h(-2) = \sqrt{1}$

$h(-2) = 1$

$h(1) = \sqrt{1+3}$

$h(1) = \sqrt{4}$

$h(1) = 2$

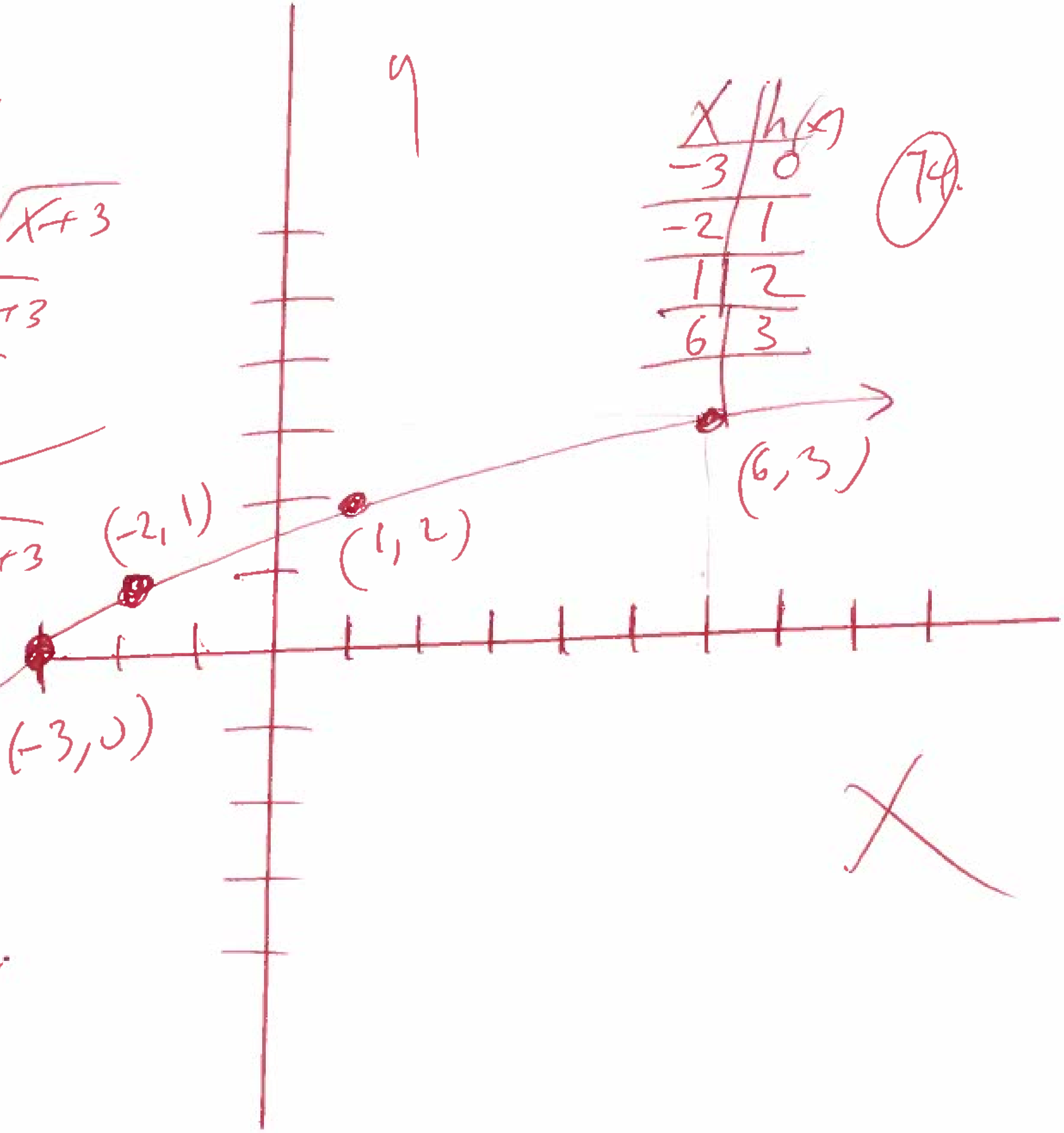
$h(6) = \sqrt{6+3}$

$h(6) = \sqrt{9}$

$h(6) = 3$

x	$h(x)$
-3	0
-2	1
1	2
6	3

74



use a graphing calculator

$y_1 = h(x) = \sqrt{x+3}$

75. Graph

$g(x) = (x-4)^3 - 2$

$g(2) = (2-4)^3 - 2$

$g(2) = (-2)^3 - 2$

$g(2) = (-2)(-2)(-2) - 2$

$g(2) = -8 - 2$

$g(2) = -10$

$g(3) = (3-4)^3 - 2$

$g(3) = (-1)^3 - 2$

$g(3) = (-1)(-1)(-1) - 2$

$g(3) = -1 - 2$

$g(3) = -3$

$g(4) = (4-4)^3 - 2$

$g(4) = (0)^3 - 2$

$g(4) = (0)(0)(0) - 2$

$g(4) = 0 - 2$

$g(4) = -2$

$g(5) = (5-4)^3 - 2$

$g(5) = (1)^3 - 2$

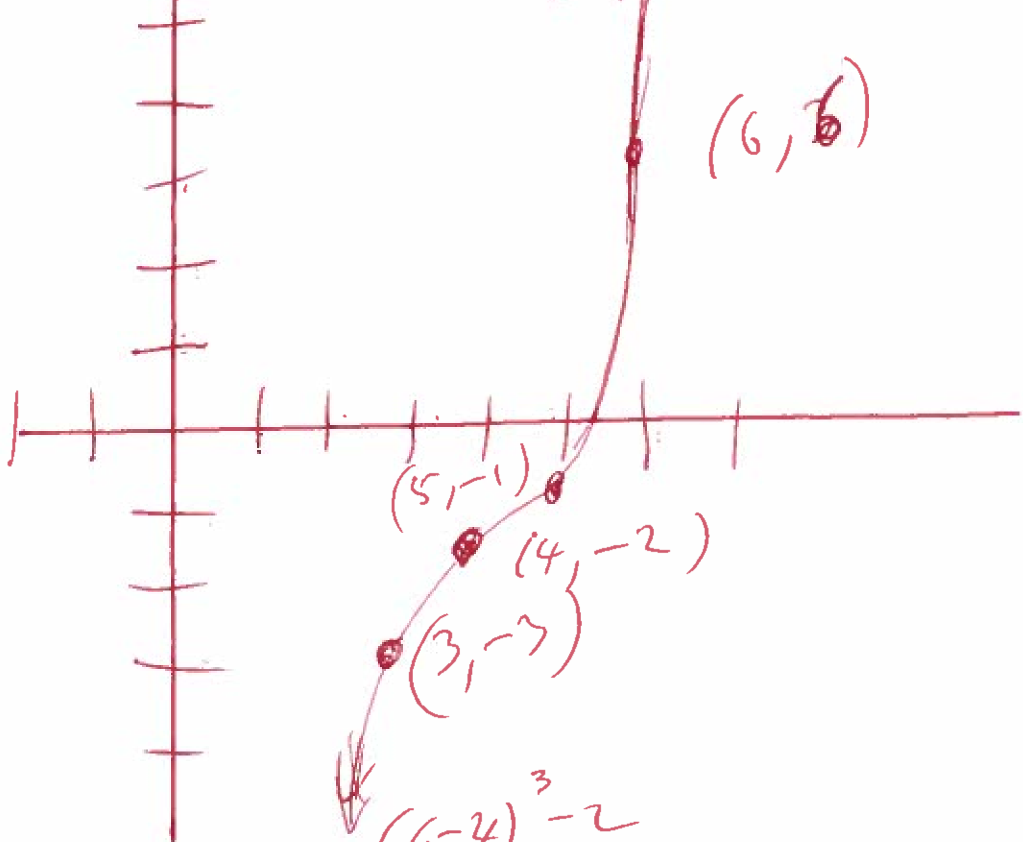
$g(5) = (1)(1)(1) - 2$

$g(5) = 1 - 2$

$g(5) = -1$

x	$g(x)$
2	-10
3	-3
4	-2
5	-1
6	6

75



$g(6) = (6-4)^3 - 2$

$g(6) = (2)^3 - 2$

$g(6) = (2)(2)(2) - 2$

$g(6) = 8 - 2$

$g(6) = 6$

use a graphing calculator

$y_1 = (x-3)^3 - 2$

76

graph

$g(x) = 5(x+4)^2+1$

$g(-5) = 5(-5+4)^2+1$

$g(-5) = 5(-1)^2+1$

$g(-5) = 5(-1)(-1)+1$

$g(-5) = 5(1)+1$

$g(-5) = 5+1$

$g(-5) = 6$

$g(-4) = 5(-4+4)^2+1$

$g(-4) = 5(0)^2+1$

$g(-4) = 5(0)(0)+1$

$g(-4) = 5(0)+1$

$g(-4) = 0+1$

$g(-4) = 1$

$g(-3) = 5(-3+4)^2+1$

$g(-3) = 5(1)^2+1$

$g(-3) = 5(1)(1)+1$

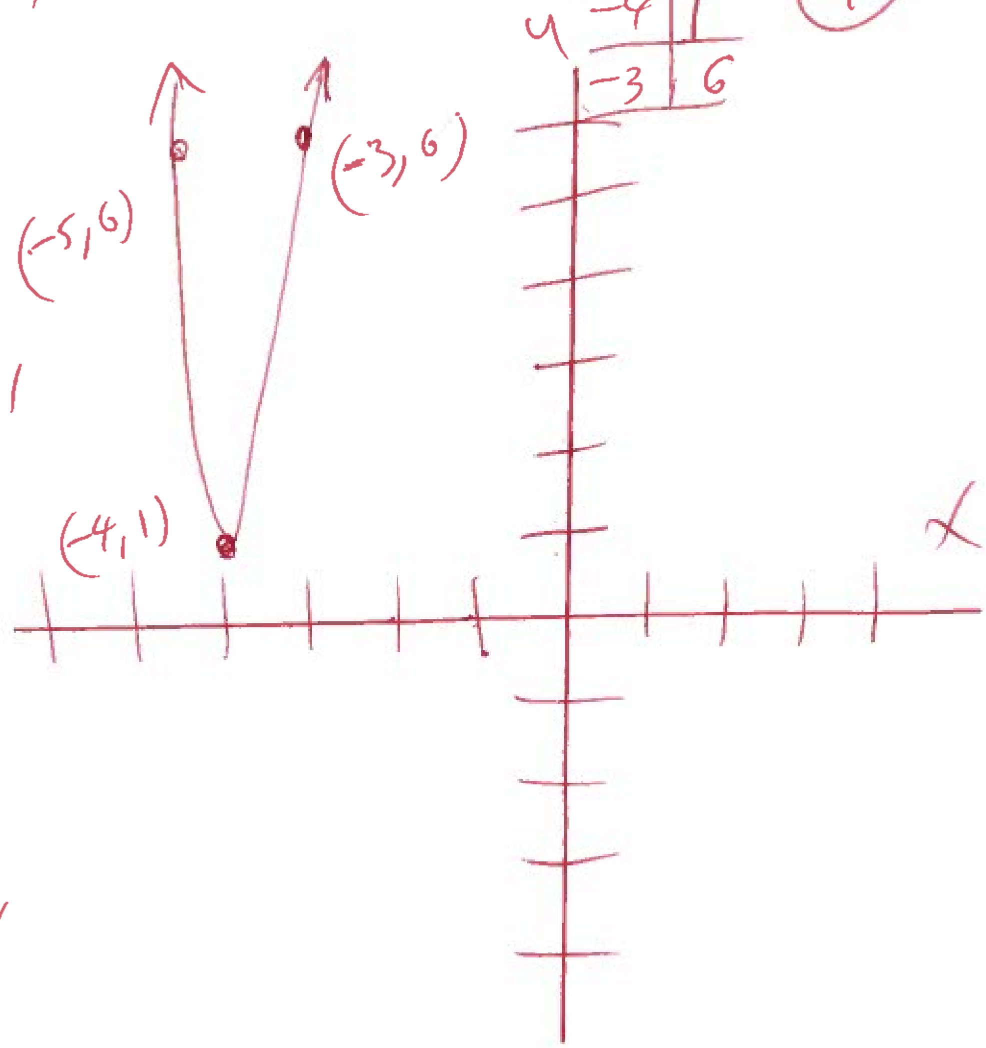
$g(-3) = 5(1)+1$

$g(-3) = 5+1$

$g(-3) = 6$

x	$g(x)$
-5	6
-4	1
-3	6

76



use a graphing calculator

$y_1 = 5(x+4)^2+1$

77 graph

$h(x) = \frac{1}{9x}$

$h(-2) = \frac{1}{9(-2)}$

$h(-2) = \frac{1}{-18}$

$h(-1) = \frac{1}{9(-1)}$

$h(-1) = \frac{1}{-9}$

$h(-\frac{1}{9}) = \frac{1}{9(-\frac{1}{9})}$

$h(-\frac{1}{9}) = \frac{1}{-1}$

$h(-\frac{1}{9}) = -1$

$h(\frac{1}{9}) = \frac{1}{9(\frac{1}{9})}$

$h(\frac{1}{9}) = \frac{1}{1}$

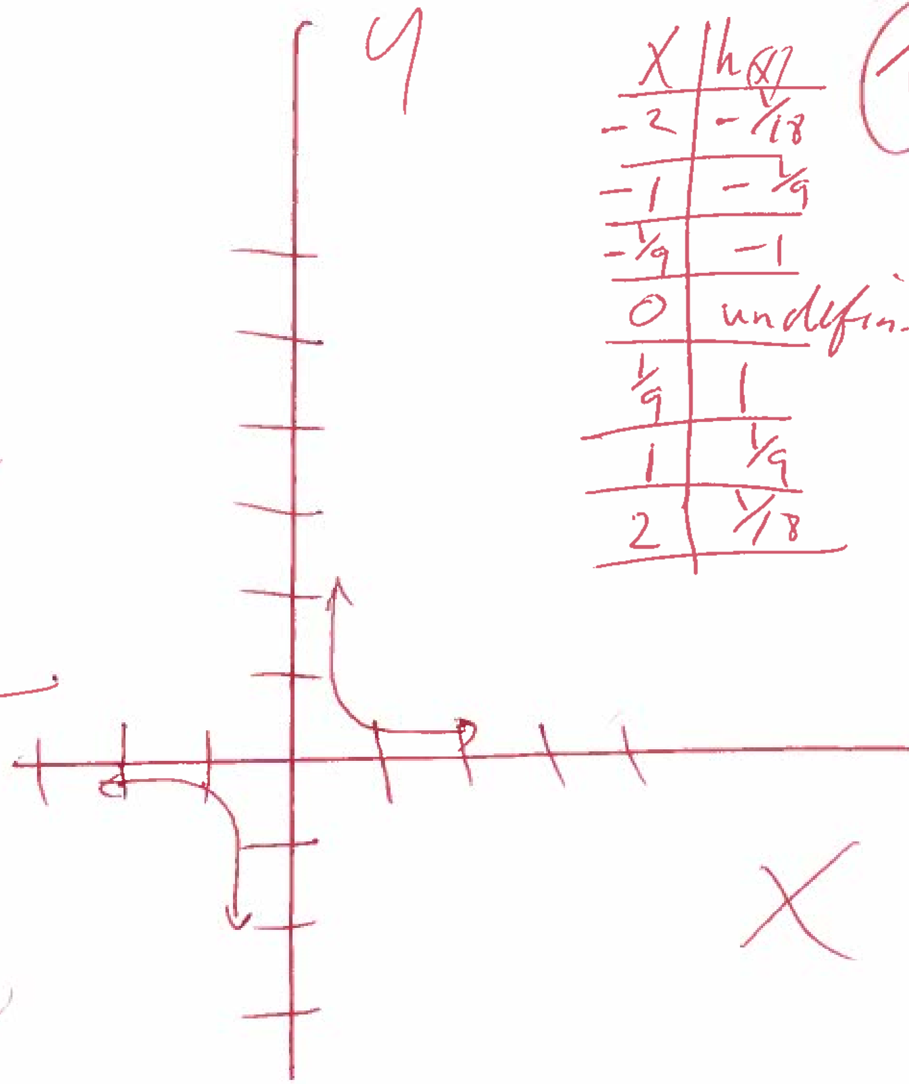
$h(\frac{1}{9}) = 1$

$h(1) = \frac{1}{9(1)}$

$h(1) = \frac{1}{9}$

$h(2) = \frac{1}{9(2)}$

$h(2) = \frac{1}{18}$



x	h(x)
−2	$-\frac{1}{18}$
−1	$-\frac{1}{9}$
$-\frac{1}{9}$	−1
0	undefined
$\frac{1}{9}$	1
1	$\frac{1}{9}$
2	$\frac{1}{18}$

77.

OR use a graphing calculator

$y_1 = (1)/(9x)$

78

$F = \frac{9}{5}C + 32$

C	F
0	32
100	212

78

$F = \frac{9}{5}(0) + 32$

$F = 0 + 32$

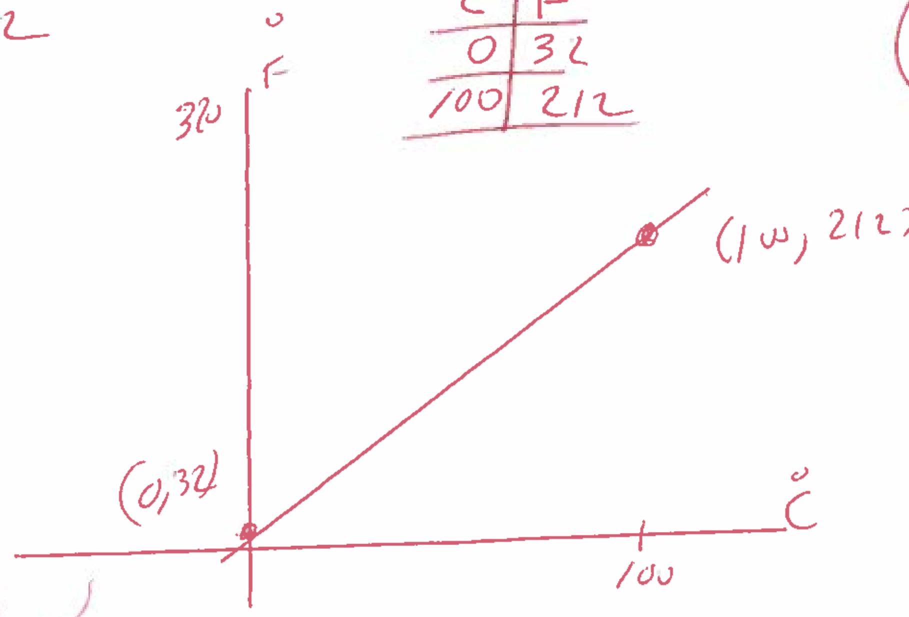
$F = 32$

$F = \frac{9}{5}(100) + 32$

$F = 9(20) + 32$

$F = 180 + 32$

$F = 212$



$K = C + 273$

$K - 273 = C$ subst

K	F
273	32
440	332.6

$F = \frac{9}{5}C + 32$

$F = \frac{9}{5}(K - 273) + 32$

$F = \frac{9}{5}(273 - 273) + 32$

$F = \frac{9}{5}(0) + 32$

$F = 0 + 32$

$F = 32$

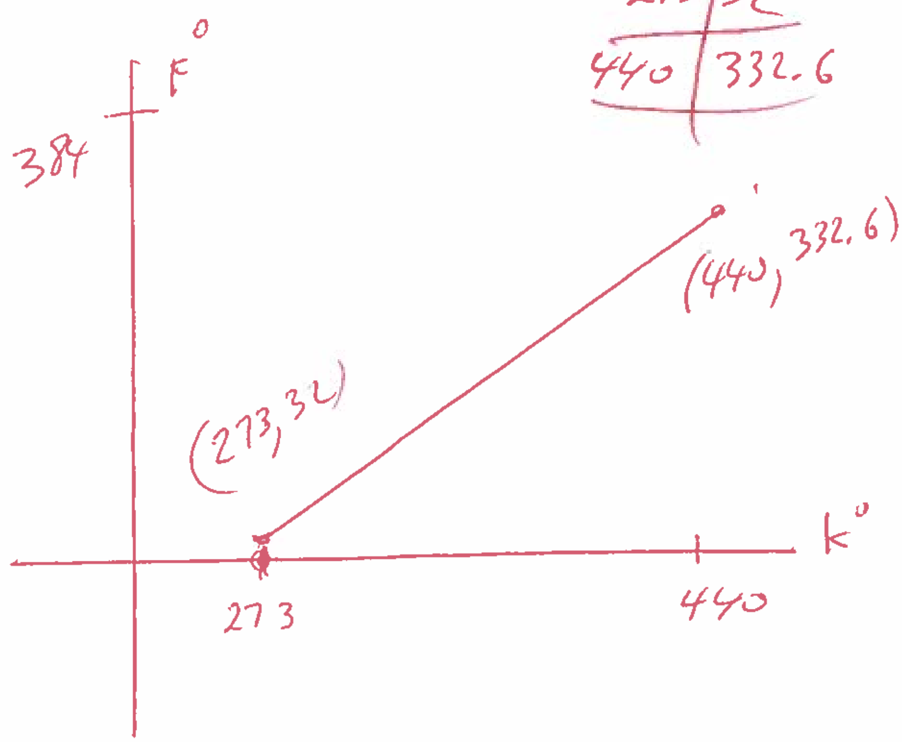
$F = \frac{9}{5}(440 - 273) + 32$

$F = \frac{9}{5}((167) + 32$

$F = 1.8(167) + 32$

$F = 300.6 + 32$

$F = 332.6$



79

Find the equation of the line through the points $(-4,-4)$ and $(4,6)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

Data 79

x	-4	-2	0	2	4
y	-4	-1	2	4	6

$$y - y_1 = \frac{y_1 - y_2}{x_1 - x_2}(x - x_1)$$

$$y - (-4) = \frac{(-4)-(6)}{(-4)-(4)}(x - (-4))$$

$$y + 4 = \frac{-4-6}{-4-4}(x+4)$$

$$y + 4 = \frac{-10}{-8}(x+4)$$

$$y + 4 = \frac{-\cancel{2}(5)}{-\cancel{2}(4)}(x+4)$$

$$y + 4 = \frac{5}{4}(x+4)$$

$$y + 4 = \frac{5}{4}x + \frac{5}{\cancel{4}}(\cancel{4})$$

$$y + 4 = \frac{5}{4}x + 5$$

$$y + \cancel{4} - \cancel{4} = \frac{5}{4}x + 5 - 4$$

$$y = \frac{5}{4}x + 1$$

Use graphing calculator

stat, edit, L1, L2, stat, CALC, LinReg(ax+b),

$$y = ax + b$$

$$y = 1.25x + 1.4$$

(80) Find the equation of the line through the points (80)

(-19, 102) and (-9, 142)

x_1 y_1 x_2 y_2

Data

x	-19	-16	-14	-13	-9
y	102	122	120	132	142

$$y - y_1 = \frac{y_1 - y_2}{x_1 - x_2}(x - x_1)$$

$$y - (102) = \frac{(102) - (142)}{(-19) - (-9)}(x - (-19))$$

$$y - 102 = \frac{102 - 142}{-19 + 9}(x + 19)$$

$$y - 102 = \frac{-40}{-10}(x + 19)$$

$$y - 102 = 4(x + 19)$$

$$y - 102 = 4x + 76$$

$$y - \cancel{102} + \cancel{102} = 4x + 76 + 102$$

$$y = 4x + 178$$

use graphing calculator

stat, edit, L1, L2, stat, CALC, LinReg(ax+b),

$y = ax + b$

$y = 3.861313869x + 178.4306569$

81. graph

$f(x) = x^2 + 1$

x	$f(x)$
-1	2
0	1
1	2

81

$f(-1) = (-1)^2 + 1$

$f(-1) = (-1)(-1) + 1$

$f(-1) = 1 + 1$

$f(-1) = 2$

$f(0) = (0)^2 + 1$

$f(0) = (0)(0) + 1$

$f(0) = 0 + 1$

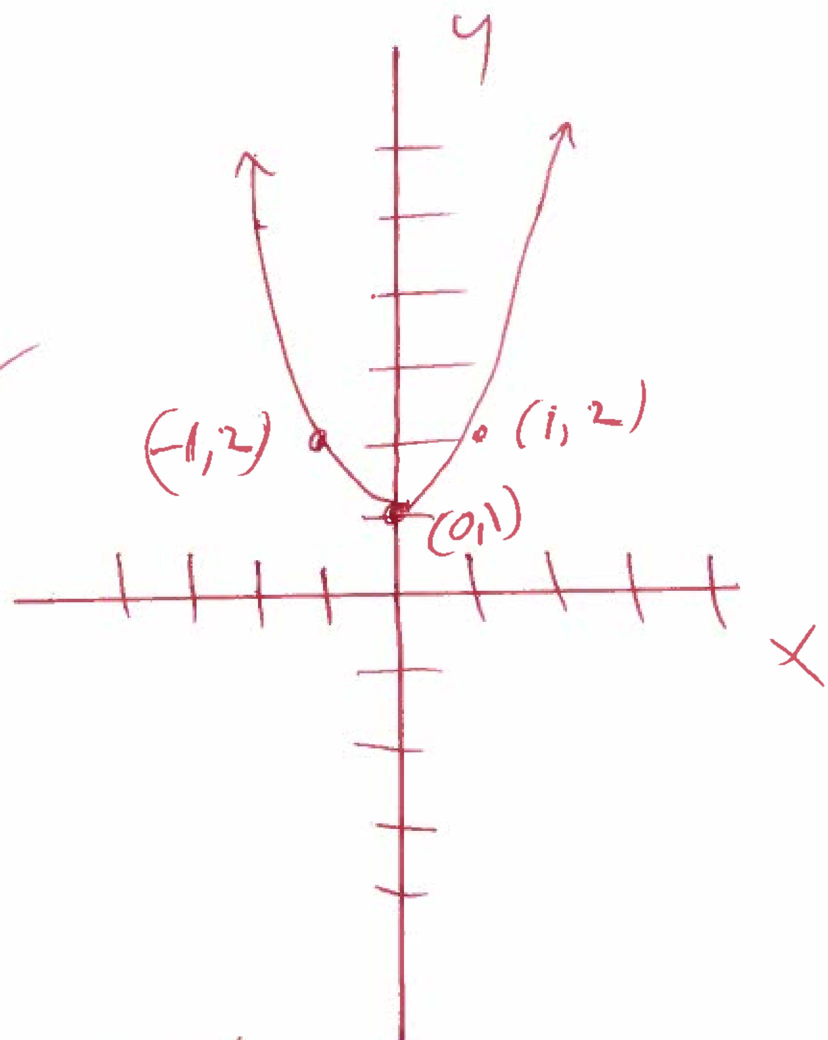
$f(0) = 1$

$f(1) = (1)^2 + 1$

$f(1) = (1)(1) + 1$

$f(1) = 1 + 1$

$f(1) = 2$



use a graphing calculator

$y_1 = x^2 + 1$

82) graph $f(x) = x^2 - 2x + 6$

$a = 1,\ b = -2,\ c = 6$

vertex $= \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

vertex $= \left(\frac{-(-2)}{2(1)}, f\left(\frac{-(-2)}{2(1)}\right)\right)$

vertex $= \left(\frac{2}{2}, f\left(\frac{2}{2}\right)\right)$

vertex $= (1, f(1))$

vertex $= (1, (1)^2 - 2(1) + 6)$

vertex $= (1, 1 - 2 + 6)$

vertex $= (1, 5)$

$y = f(x) = x^2 - 2x + 6$

~~$0 = x^2 - 2x + 6$~~

Find the y-intercept let $x = 0$

$f(0) = (0)^2 - 2(0) + 6$

$f(0) = (0)(0) - 2(0) + 6$

$f(0) = 0 - 0 + 6$

$f(0) = 6$

$f(x) = x^2 - 2x + 6$

$f(2) = (2)^2 - 2(2) + 6$

$f(2) = 4 - 4 + 6$

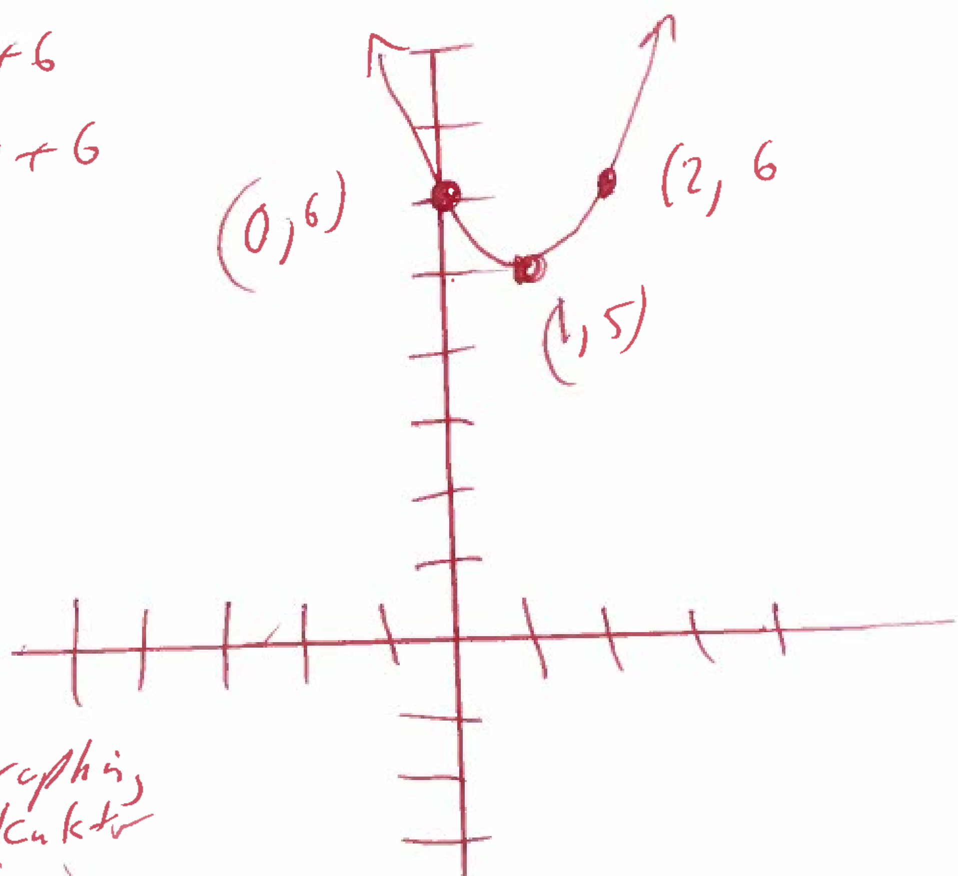
$f(2) = 6$

use a graphing calculator

$y_1 = x^2 - 2x + 6$

x	f(x)
0	6
1	5
2	6

82



83. Graph $f(x) = (x+3)^2 - 7$

$f(-4) = (-4+3)^2 - 7$

$f(-4) = (-1)^2 - 7$

$f(-4) = (-1)(-1) - 7$

$f(-4) = 1 - 7$

$f(-4) = -6$

$f(-3) = (-3+3)^2 - 7$

$f(-3) = (0)^2 - 7$

$f(-3) = (0)(0) - 7$

$f(-3) = 0 - 7$

$f(-3) = -7$

$f(-2) = (-2+3)^2 - 7$

$f(-2) = (1)^2 - 7$

$f(-2) = (1)(1) - 7$

$f(-2) = 1 - 7$

$f(-2) = -6$

$f(0) = (0+3)^2 - 7$

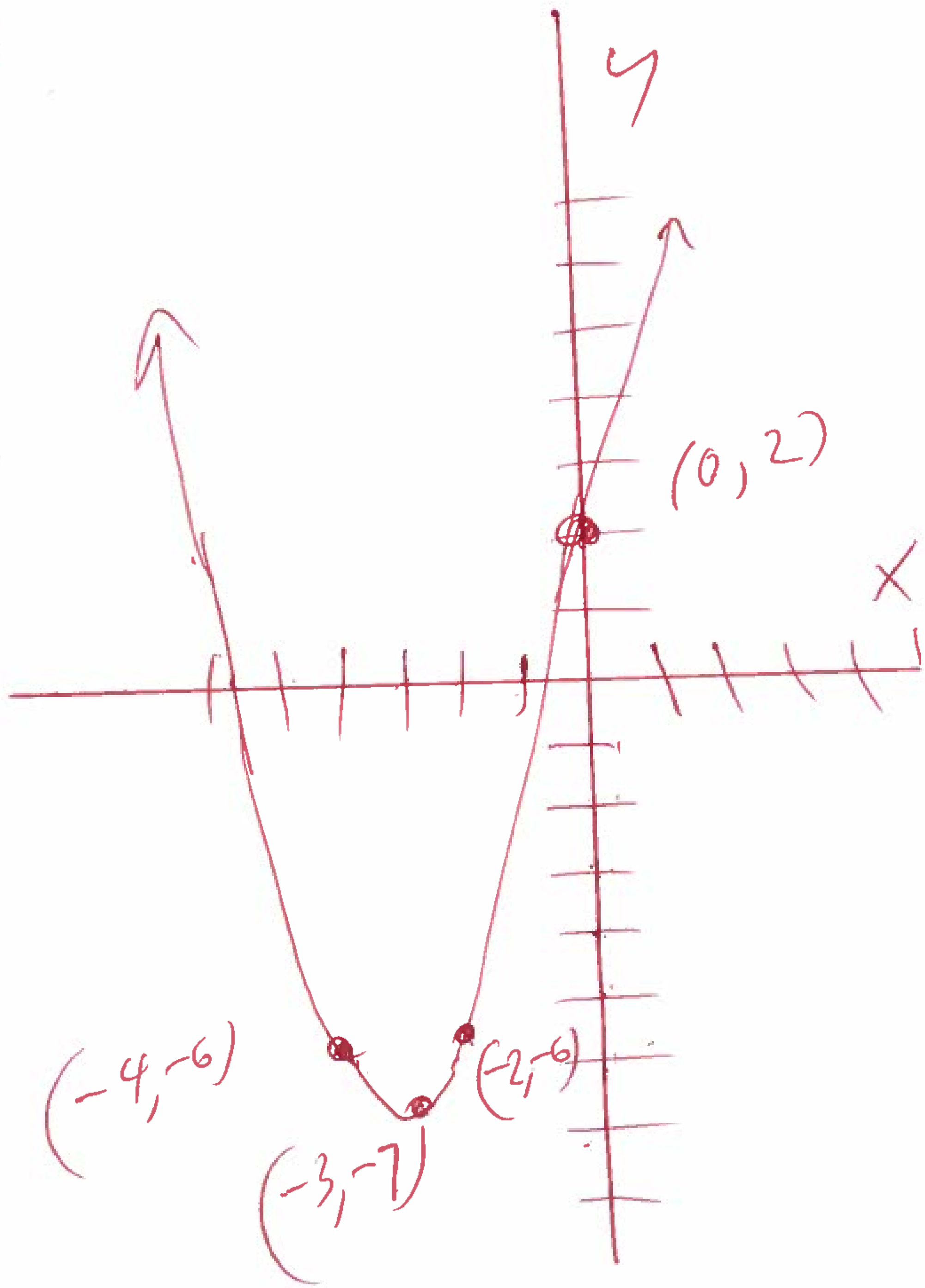
$f(0) = (3)^2 - 7$

$f(0) = (3)(3) - 7$

$f(0) = 9 - 7 = 2$

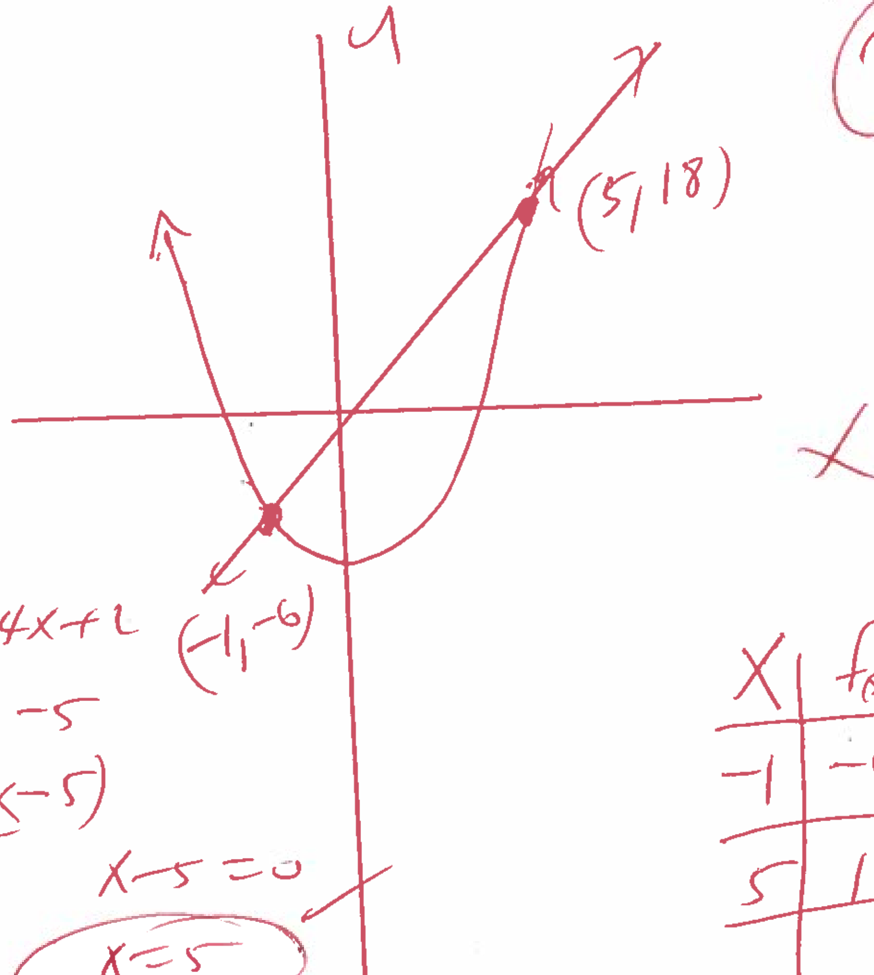
x	f(x)
-4	-6
-3	-7
-2	-6
0	2

83



84 graph $f(x) = 4x - 2$ and $g(x) = x^2 - 7$

84



Solve $f(x) = g(x)$

$4x - 2 = x^2 - 7$

$0 = x^2 - 7 - 4x + 2$

$0 = x^2 - 4x - 5$

$0 = (x + 1)(x - 5)$

$x + 1 = 0$ or $x - 5 = 0$

$x = -1$ or $x = 5$

x	f(x)
-1	-6
5	18

$f(x) = 4x - 2$

$f(-1) = 4(-1) - 2$

$f(-1) = -4 - 2$

$f(-1) = -6$

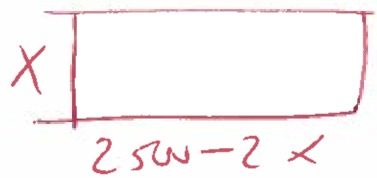
$f(5) = 4(5) - 2$

$f(5) = 20 - 2$

$f(5) = 18$

85

85



Find max

$f(x) = x(2500 - 2x)$

$f(x) = 2500x - 2x^2$

$f(x) = -2x^2 + 2500x$

$a = -2, \quad b = 2500, \quad c = 0$

vertex $= \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

vertex $= \left(-\frac{(2500)}{2(-2)}, f\left(-\frac{(2500)}{2(-2)}\right)\right)$

vertex $= \left(\frac{-2500}{-4}, f\left(\frac{-2500}{-4}\right)\right)$

vertex $= (625, f(625))$

vertex $= (625, -2(625)^2 + 2500(625))$

vertex $= (625, 781250)$

86. $h(x) = \frac{-32x^2}{(50)^2} + 1x + 210$

86.

$a = \frac{-32}{(50)^2}$, $b = 1$, $c = 210$

Vertex $= \left(-\frac{b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

Vertex $= \left(\frac{-(1)}{2\left(\frac{-32}{(50)^2}\right)}, f\left(\frac{(-1)}{2\left(\frac{-32}{(50)^2}\right)}\right)\right)$ use graphing calculator

Vertex $= (39.0625, f(39.0625))$

Vertex $= \left(39.0625, \frac{-32(39.0625)^2}{(50)^2} + 1(39.0625) + 210\right)$

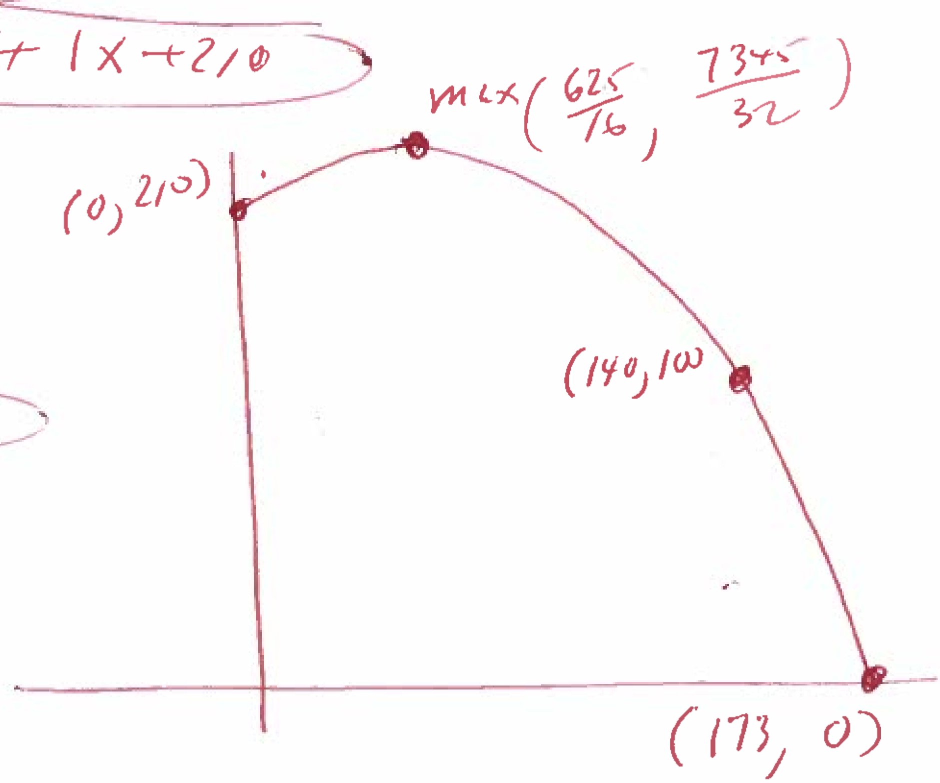
Vertex $= (39.0625, 229.53125)$ use graphing calculator

Vertex $= \left(\frac{625}{16}, \frac{7345}{32}\right)$ math frac key

MAX

graph
Xmin = 0
Xmax = 180
Xscl = 20
Ymin = 0
Ymax = 250
Yscl = 50

$Y_1 = -32/(50)^2 X^2 + 1X + 210$



$f(173) \equiv 0$

$f(140) \equiv 100$

87

87

$x^2 - 2x - 8 < 0$

$(x+2)(x-4) < 0$

set $x+2=0$ OR $x-4=0$

$x+\cancel{2}-\cancel{2}=0-2$ OR $x\cancel{-4}\cancel{+4}=0+4$

$x=-2$ OR $x=4$

$-2 < x < 4$

$(-2, 4)$

Check

$(x+2)(x-4) < 0$

$(-3+2)(-3-4) < 0$

$(-1)(-7) < 0$

$7 < 0$ NO

$(x+2)(x-4) < 0$

$(1+2)(1-4) < 0$

$(3)(-3) < 0$

$-9 < 0$ yes

$(x+2)(x-4) < 0$

$(5+2)(5-4) < 0$

$(7)(1) < 0$

$7 < 0$ NO

88

88

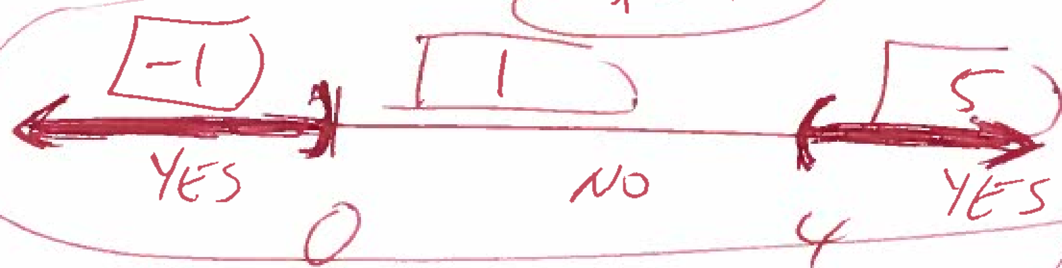
$x^2 - 4x > 0$

$x(x-4) > 0$

set $x = 0$ or $x - 4 = 0$

$x \cancel{- 4 + 4} = 0 + 4$

$x = 4$



Check

$x(x-4) > 0$

$(-1)(-1-4) > 0$

$(-1)(-5) > 0$

$5 > 0$ yes

$x < 0$ or $x > 4$

OR

$(-\infty, 0) \cup (4, \infty)$

$x(x-4) > 0$

$(1)(1-4) > 0$

$(1)(-3) > 0$

$-3 > 0$ NO

$x(x-4) > 0$

$(5)(5-4) > 0$

$5(1) > 0$

$5 > 0$ yes

89

$$x^2-4x \geq 5$$

$$x^2-4x-5 \geq 5-5$$

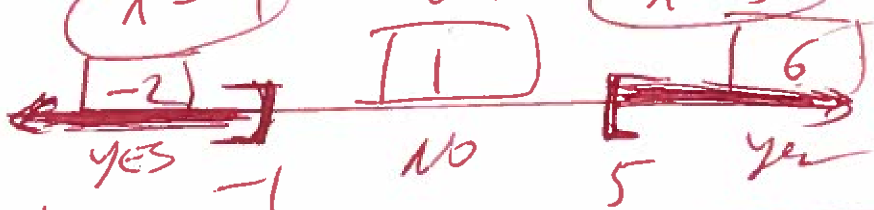
$$x^2-4x-5 \geq 0$$

$$(x+1)(x-5) \geq 0$$

let $x+1=0$ OR $x-5=0$

$x+1-1=0-1$ OR $x-5+5=0+5$

$x=-1$ OR $x=5$



$x \leq -1$ OR $x \geq 5$

$(-\infty, -1] \cup [5, \infty)$

Check

$(x+1)(x-5) \geq 0$

$(-2+1)(-2-5) \geq 0$

$(-1)(-7) \geq 0$

$7 \geq 0$ yes

$(x+1)(x-5) \geq 0$

$(1+1)(1-5) \geq 0$

$(2)(-4) \geq 0$

$-8 \geq 0$ NO

$(x+1)(x-5) \geq 0$

$(6+1)(6-5) \geq 0$

$(7)(1) \geq 0$

$7 \geq 0$ yes

90 what is the domain

90-

Formula
$a^2-b^2=(a+b)(a-b)$

$f(x)=\sqrt{x^2-121}$

let $x^2-121 \geq 0$

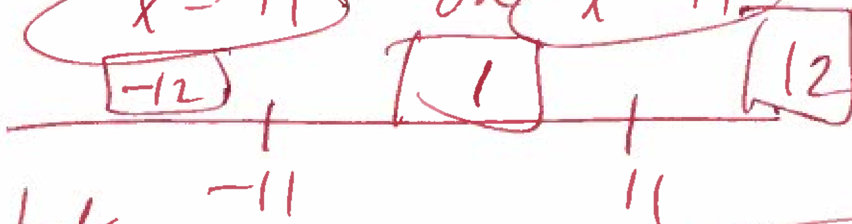
$(x)^2-(11)^2 \geq 0$

$(x+11)(x-11) \geq 0$

let $x+11=0$ or $x-11=0$

$x+\cancel{11}-\cancel{11}=0-11$ OR $x-\cancel{11}+\cancel{11}=0+11$

$x=-11$ or $x=11$



Check

$(x+11)(x-11) \geq 0$

$(-12+11)(-12-11) \geq 0$

$(-1)(-23) \geq 0$

$23 \geq 0$ yes

$(-\infty,-11] \cup [11,\infty)$

$x \leq -11$ or $x \geq 11$

$(x+11)(x-11) \geq 0$

$(1+11)(1-11) \geq 0$

$(12)(-10) \geq 0$

$-120 \geq 0$ NO

$(x+11)(x-11) \geq 0$

$(12+11)(12-11) \geq 0$

$(23)(+1) \geq 0$

$+23 \geq 0$

$23 \geq 0$ yes

91. Determine whether the following function is a polynomial function

91.

$G(x) = 4(x-1)^2(x^2+3)$

$G(x) = 4(x-1)(x-1)(x^2+3)$

$G(x) = 4(x-1)(x^3+3x-1x^2-3)$

$G(x) = 4(x-1)(x^3-1x^2+3x-3)$

$G(x) = 4(x^4-1x^3+3x^2-3x-1x^3+1x^2-3x+3)$

$G(x) = 4(x^4-2x^3+4x^2-6x+3)$

$G(x) = 4x^4-8x^3+16x^2-24x+12$

standard form

leading term $4x^4$

constant term 12

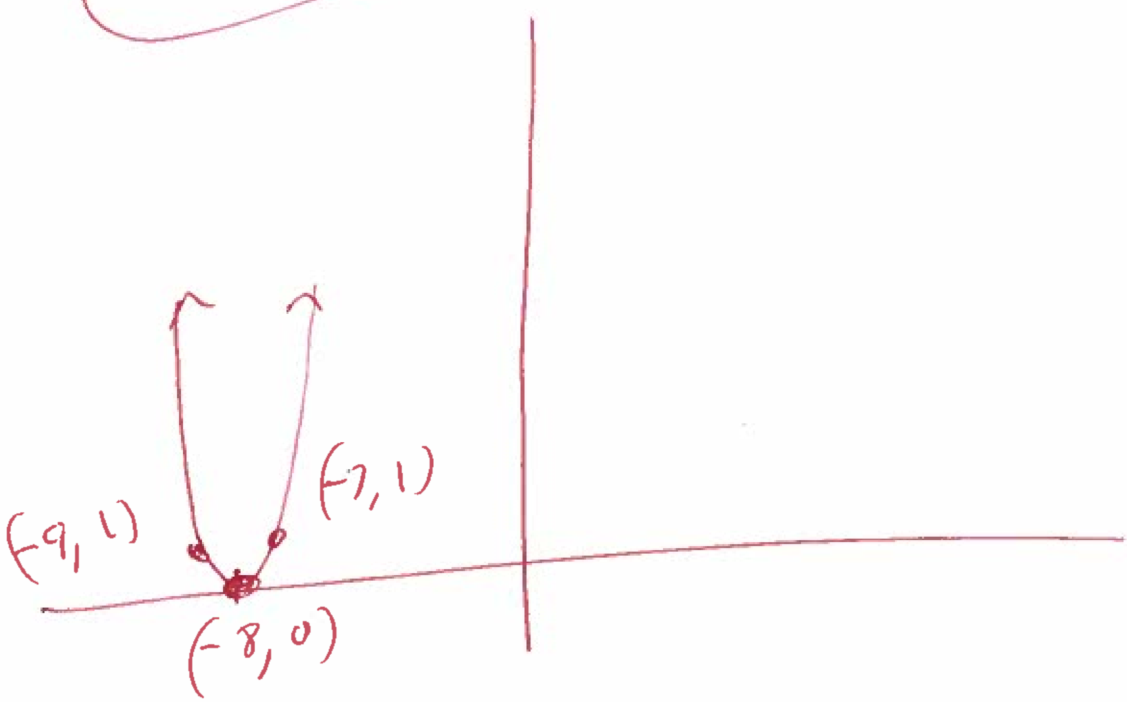
92

graph

$f(x) = (x+8)^4$

$y_1 = (x+8)^4$

use graphing calculator



92

93. Form a polynomial whose zeros and degree are given.

93.

Zeros $-3, 3, 5$; degree $= 3$

$x = -3, \quad x = 3, \quad x = 5$

$x + 3 = -\cancel{3} + \cancel{3}, \quad x - 3 = 3 - \cancel{3}, \quad \cancel{x - 5 = 5 - 5}$

$x + 3 = 0, \quad x - 3 = 0, \quad x - 5 = 0,$

$(x+3)(x-3)(x-5) = 0$

$(x+3)(x^2 - 5x - 3x + 15) = 0$

$(x+3)(x^2 - 8x + 15) = 0$

$(x^3 - 8x^2 + 15x + 3x^2 - 24x + 45) = 0$

$x^3 - 5x^2 - 9x + 45 = 0$

$f(x) = x^3 - 5x^2 - 9x + 45$

94 form a polynomial whose real zeros and degree are given.

94

zeros $-1, 0, 2$; degree $= 3$

$x=-1, \quad x=0, \quad x=2$

$x+1=-1+1, \quad x=0, \quad x-2=2-2$

$x+1=0, \quad x=0, \quad x-2=0$

$(x+1)(x)(x-2)=0$

$(x+1)(x^2-2x)=0$

$x^3-2x^2+1x^2-2x=0$

$x^3-1x^2-2x=0$

$x^3-x^2-2x=0$

$f(x)=x^3-x^2-2x$

95. Find a polynomial function with the zeros $-2, 1, 5$ whose graph passes through the point $(6, 80)$.

98

$x = -2, \quad x = 1, \quad x = 5$

$x + 2 = -2 + 2, \quad x - 1 = \cancel{x-1}, \quad x - 5 = 5 - 5$

$x + 2 = 0, \quad x - 1 = 0, \quad x - 5 = 0$

$(x+2)(x-1)(x-5) = 0$

$(x+2)(x^2 - 5x - 1x + 5) = 0$

$(x+2)(x^2 - 6x + 5) = 0$

$x^3 - 6x^2 + 5x + 2x^2 - 12x + 10 = 0$

$x^3 - 4x^2 - 7x + 10 = 0$

point $(6, 80)$
$\quad\ \ x \quad f(x)$

set $f(x) = a(x^3 - 4x^2 - 7x + 10)$

$f(6) = a((6)^3 - 4(6)^2 - 7(6) + 10) = 80$

$f(6) = a((6)(6)(6) - 4(6)(6) - 7(6) + 10) = 80$

$a(216 - 144 - 42 + 10) = 80$

$a(40) = 80$

$40a = 80$

$\frac{40a}{40} = \frac{80}{40}$

$a = 2$

$f(x) = 2(x^3 - 4x^2 - 7x + 10)$

$f(x) = 2x^3 - 8x^2 - 14x + 20$

(96) $f(x) = -9(x-4)(x+3)^2$ (96)

set $-9(x-4)(x+3)^2 = 0$

$\cancel{-9=0}$ or $x-4=0$ or $(x+3)^2 = 0$

$x-4+4 = 0+4$ or $\sqrt{(x+3)^2} = \sqrt{0}$

$x=4$ or $x+3=0$

$x+3-3 = 0-3$

$x=-3$

The real zeros of f are $x=4$, $x=-3$.

The multiplicity of 4 is 1. crosses x-axis

the multiplicity of -3 is 2. touches x-axis

The maximum number of turning points on the graph is 2 turns.

type of power function ~~the~~ that the graph of f resembles for large value of $|x|$. is

$y = -9x^3$

graph use graphing calculator

$y = -9(x-4)(x+3)^2$

97.

97.

$f(x) = 49x - x^3$

set $49x - x^3 = 0$

formula

$a^2 - b^2 = (a+b)(a-b)$

$x(49 - x^2) = 0$

$x((7)^2 - (x)^2) = 0$

$x(7+x)(7-x) = 0$

$x = 0$ OR $7 + x = 0$ OR $7 - x = 0$

$\cancel{7} + x - \cancel{7} = 0 - 7$ OR $\cancel{7} - x - \cancel{7} = 0 - 7$

$x = -7$ OR $-x = -7$

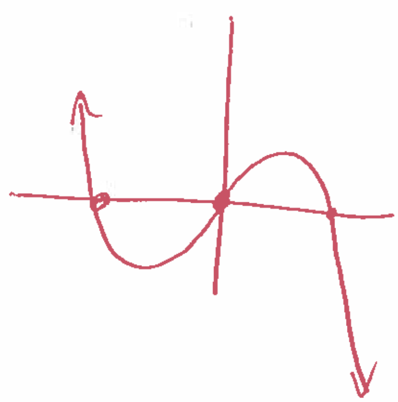
OR $\frac{-x}{-1} = \frac{-7}{-1}$

OR $x = 7$

use graphing calculator

graph

$y_1 = 49x - x^3$



xmin = -20
xmax = 20
xscl = 1
ymin = -300
ymax = 300
yscl = 1

98. Construct a polynomial function f with the following characteristics 98.

Zeros -1 (multiplicity 2) $x=-1$ $x+1=0$

2 (multiplicity 1) $x=2$ $x-2=0$

3 (multiplicity 1) $x=3$ $x-3=0$

degree 4

Contains the point $(1,16)$

$f(x)=a(x+1)(x+1)(x-2)(x-3)$

$f(1)=a(1+1)(1+1)(1-2)(1-3)=16$

$a(2)(2)(-1)(-2)=16$

$a(8)=16$

$8a=16$

$\frac{8a}{8}=\frac{16}{8}$

$a=2$

$f(x)=2(x+1)(x+1)(x-2)(x-3)$

$f(x)=2(x+1)^2(x-2)(x-3)$

99 graph $f(x) = \frac{1}{x}$

$f(-2) = \frac{1}{-2} = -\frac{1}{2}$

$f(-1) = \frac{1}{-1} = -1$

$f(-\frac{1}{2}) = \frac{1}{-\frac{1}{2}} = \frac{1}{1} \cdot \frac{-2}{1} = \frac{-2}{1} = -2$

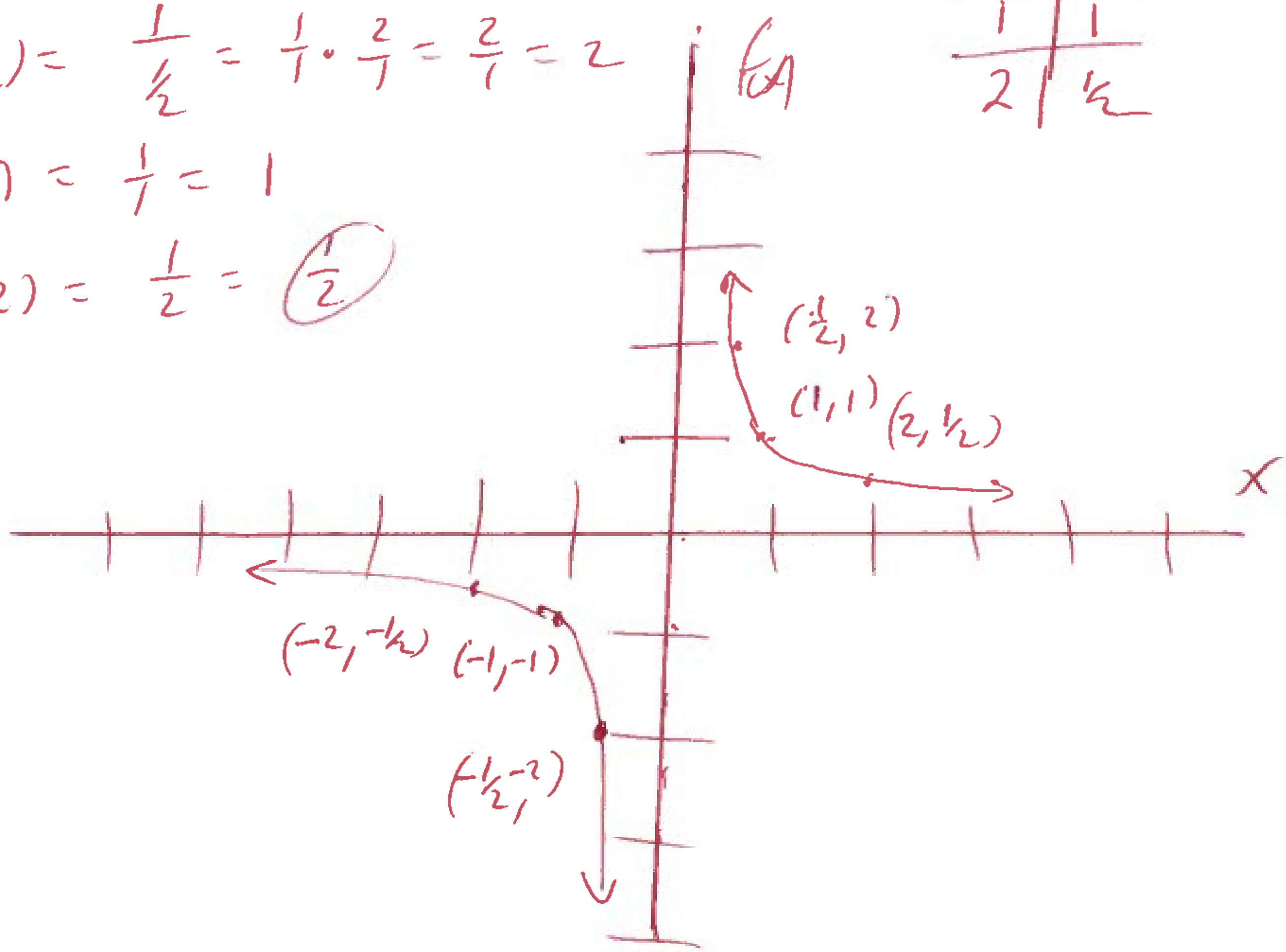
$f(\frac{1}{2}) = \frac{1}{\frac{1}{2}} = \frac{1}{1} \cdot \frac{2}{1} = \frac{2}{1} = 2$

$f(1) = \frac{1}{1} = 1$

$f(2) = \frac{1}{2} = \frac{1}{2}$

x	$f(x)$
-2	$-\frac{1}{2}$
-1	-1
$-\frac{1}{2}$	-2
0	undf
$\frac{1}{2}$	2
1	1
2	$\frac{1}{2}$

99



use graphing calculator

$y_1 = 1/x$

100 graph

$$f(x) = 2(x+3)^2 - 1$$

x	$f(x)$
-4	1
-3	-1
-2	1

$f(-4) = 2(-4+3)^2 - 1$

$f(-4) = 2(-1)^2 - 1$

$f(-4) = 2(-1)(-1) - 1$

$f(-4) = 2(1) - 1$

$f(-4) = 2 - 1$

$f(-4) = 1$

$f(-3) = 2(-3+3)^2 - 1$

$f(-3) = 2(0)^2 - 1$

$f(-3) = 2(0)(0) - 1$

$f(-3) = 2(0) - 1$

$f(-3) = 0 - 1$

$f(-3) = -1$

$f(-2) = 2(-2+3)^2 - 1$

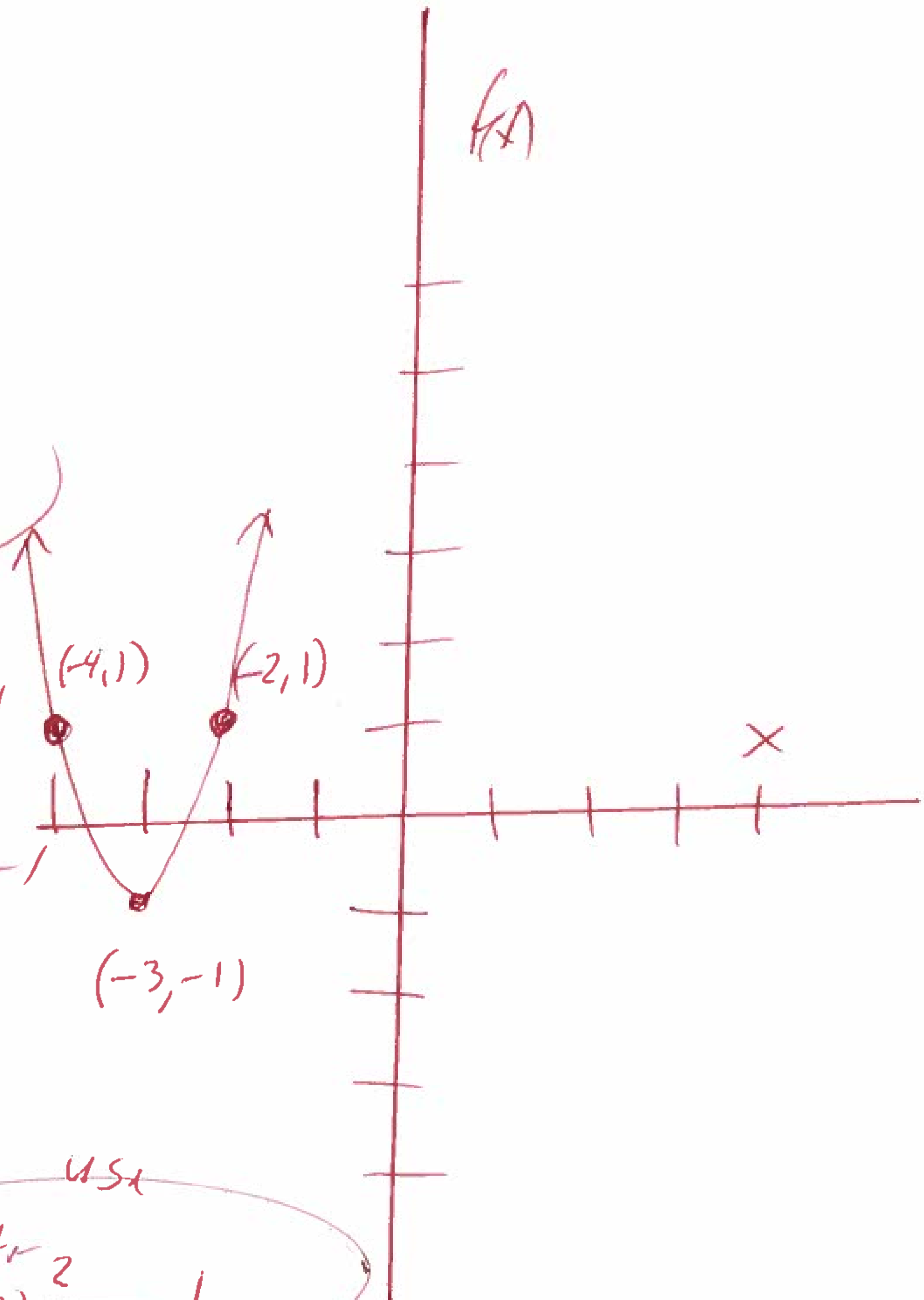
$f(-2) = 2(1)^2 - 1$

$f(-2) = 2(1)(1) - 1$

$f(-2) = 2(1) - 1$

$f(-2) = 2 - 1$

$f(-2) = 1$



or use graphing calculator

$y_1 = 2(x+3)^2 - 1$

(101) Find the domain of the following rational function.

(101)

$$R(x)=\frac{5x}{x+11}$$

let $x+11=0$

$$x+\cancel{11}-\cancel{11}=0-11$$

$$x=-11$$

domain

$$\{x \mid x \neq -11\}$$

$$(-\infty,-11)\cup(-11,\infty)$$

102 find the domain of the following function

102

$$H(x)=\frac{-9x^2}{(x-5)(x+5)}$$

set $(x-5)(x+5)=0$

$x-5=0$ or $x+5=0$

$x\cancel{-5}\cancel{+5}=0+5$ OR $x\cancel{+5}\cancel{-5}=0-5$

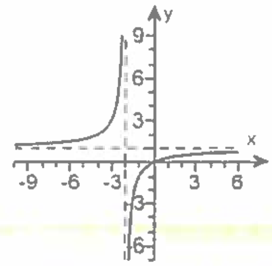
$x=5$ or $x=-5$

domain

$\{x \mid x\neq 5 \text{ or } x\neq -5\}$

$(-\infty,-5)\cup(-5,5)\cup(5,\infty)$

103. Use the graph shown to find the following.
(a) The domain and range of the function
(b) The intercepts, if any
(c) Horizontal asymptotes, if any
(d) Vertical asymptotes, if any
(e) Oblique asymptotes, if any



103

(a) What is the domain? Select the correct choice below and fill in any answer boxes within your choice.

A. The domain of the function is $\{x \mid$ X≠-2 $\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The domain of the function in the graph is the set of all real numbers.

What is the range? Select the correct choice below and fill in any answer boxes within your choice.

A. The range of the function is $\{y \mid$ Y≠1 $\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The range of the function in the graph is the set of all real numbers.

(b) Find the x-intercepts, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A. x = 0
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no x-intercepts.

Find the y-intercepts, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A. y = 0
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no y-intercepts.

(c) Find the horizontal asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A. y = 1
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no horizontal asymptotes.

Find the vertical asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A. x = -2
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no vertical asymptotes.

Find the oblique asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

A. y = ______ (Simplify your answer. Use a comma to separate answers as needed.)

B. There are no oblique asymptotes

104 Find the vertical, horizontal, and oblique asymptotes, if any, for the following rational function.

104

$$R(x) = \frac{9x}{x+13}$$

Set $x+13=0$

$x+\cancel{13}-\cancel{13}=0-13$

$x=-13$ vertical asymptote

$$\lim_{x\to\infty} \frac{9x}{x+13}$$

$$\lim_{x\to\infty} \left(\frac{9x}{x+13}\right)\frac{\frac{1}{x}}{\frac{1}{x}} = \text{Mult}$$

formula
$$\lim_{x\to\infty} \frac{1}{x^n} = 0$$

$$\lim_{x\to\infty} \left(\frac{\frac{9x}{x}}{\frac{x}{x}+\frac{13}{x}}\right) =$$

$$\lim_{x\to\infty} \left(\frac{9}{1+\frac{13}{x}}\right) =$$

$$\frac{9}{1+0} =$$

$$\frac{9}{1} =$$

$$9 =$$

$y=9$ horizontal asymptote

There is no oblique since degrees are same (TOP) (Bottom)

105 find the vertical, horizontal, and Oblique asymptotes, if any, for the given rational function

105

$$Q(x) = \frac{2x^2-5x-12}{3x^2-8x-16}$$ 0.21)

3·1 1·16 2·8 4·4

$$Q(x) = \frac{(2x+3)\cancel{(x-4)}}{(3x+4)\cancel{(x-4)}}$$

factor

2·1 12·1 6·2 3·4

$$Q(x) = \frac{2x+3}{3x+4}$$ NEW

$x-4=0$
$x=4$ hole of graph

set $3x+4=0$

$3x+4-4=0-4$

$3x=-4$

$\frac{3x}{3}=\frac{-4}{3}$

$x=-\frac{4}{3}$ vertical asymptote ✓

$$\lim_{x\to\infty} \frac{2x+3}{3x+4}$$

$$\lim_{x\to\infty} \left(\frac{2x+3}{3x+4}\right)\frac{\frac{1}{x}}{\frac{1}{x}} =$$

$$\lim_{x\to\infty} \left(\frac{\frac{2x}{x}+\frac{3}{x}}{\frac{3x}{x}+\frac{4}{x}}\right) =$$

$$\lim_{x\to\infty} \left(\frac{2+\frac{3}{x}}{3+\frac{4}{x}}\right) =$$

$$\frac{2+0}{3+0} =$$

$\frac{2}{3}$

$y=\frac{2}{3}$ horizontal asymptote

Since degree of TOP / Bottom are same then NO oblique asymptote

106 Find the vertical, horizontal, and oblique asymptotes, if any, for the given rational function.

106

$$R(x) = \frac{6x^2+5x-6}{2x+3}$$

6·1 6·1
2,3 2,3

$$R(x) = \frac{\cancel{(2x+3)}(3x-2)}{\cancel{(2x+3)}}$$

factor

$$\boxed{R(x) = 3x-2}$$

hole at $2x+3=0$

$2x+\cancel{3}-\cancel{3}=0-3$

$2x=-3$

$\frac{2x}{2}=\frac{-3}{2}$

$x=-\frac{3}{2}$

no vertical asymptote

no horizontal asymptote

oblique $y=3x-2$

107

$$\frac{x+4}{x-5} < 0$$

107.

let $x+4=0$ or $x-5=0$

$x+4-4=0-4$ or $x-5+5=0+5$

$x=-4$ or $x=5$

Check

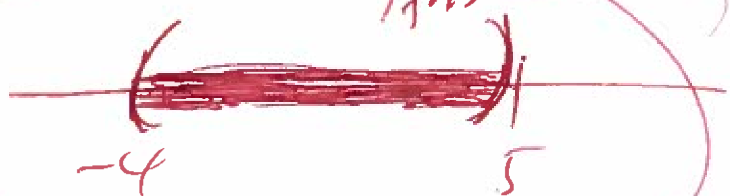
$$\frac{x+4}{x-5} < 0$$

$$\frac{-5+4}{-5-5} < 0$$

$$\frac{-1}{-10} < 0$$

$$\frac{1}{10} < 0$$ NO

Answer



$(-4, 5)$

$$\frac{x+4}{x-5} < 0$$

$$\frac{1+4}{1-5} < 0$$

$$\frac{5}{-4} < 0$$ Yes

$$\frac{x+4}{x-5} < 0$$

$$\frac{6+4}{6-5} < 0$$

$$\frac{10}{+1} < 0$$

$10 < 0$ NO

108

$$\frac{x+16}{x-5} \geq 1$$

$$\frac{x+16}{x-5} - 1 \geq 1-1$$

$$\frac{x+16}{x-5} - 1 \geq 0$$

$$\frac{x+16}{x-5} - \frac{x-5}{x-5} \geq 0$$

$$\frac{(x+16)-(x-5)}{x-5} \geq 0$$

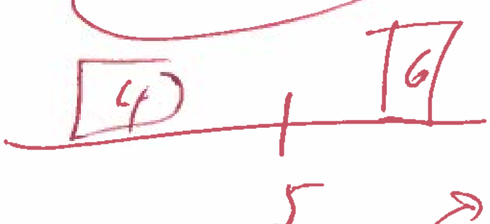
$$\frac{\cancel{x}+16-\cancel{x}+5}{x-5} \geq 0$$

$$\frac{21}{x-5} \geq 0$$

set $x-5=0$

$x-\cancel{5}+\cancel{5}=0+5$

$x=5$



Ck

$$\frac{21}{x-5} \geq 0$$

$$\frac{21}{4-5} \geq 0$$

$$\frac{21}{-1} \geq 0$$

$$-21 \geq 0$$

No

Ck

$$\frac{21}{x-5} \geq 0$$

$$\frac{21}{6-5} \geq 0$$

$$\frac{21}{1} \geq 0$$

$$21 \geq 0$$

Yes

108

Answer

$(5, \infty)$

109. Use synthetic division to find the quotient and remainder when 109

$8x^6 - x^4 + 2x^2 + 4$ is divided by $x-2$

$$\frac{8x^6 + 0x^5 - 1x^4 + 0x^3 + 2x^2 + 0x^1 + 4}{x-2}$$

opp

Use synthetic division

$$\begin{array}{r|rrrrrrr} 2 & 8 & 0 & -1 & 0 & 2 & 0 & 4 \\ & & 16 & 32 & 62 & 124 & 252 & 504 \\ \hline & 8 & 16 & 31 & 62 & 126 & 252 & 508 \end{array}$$

rem

$$8x^5 + 16x^4 + 31x^3 + 62x^2 + 126x + 252 + \frac{508}{x-2}$$

Remainder 508

$\boxed{f(2) = 508}$

110 List the potential rational zeros

$f(x) = x^7 - 20x^4 + 5x - 7$

110

$\frac{\text{Last}}{\text{First}} =$

$\frac{\pm 7}{1} =$

$\frac{\pm 7 \ \pm 1}{1} =$

$\frac{\pm 7}{1}, \ \frac{\pm 1}{1} =$

$\pm 7, \ \pm 1 =$

possibly rational roots

111 List the potential rational zeros

$f(x) = 35x^4 - x^2 + 25$

111

$\frac{\text{Last}}{\text{first}} =$

$\frac{\pm 25}{35} =$

$\frac{\pm 25, \pm 5, \pm 1}{35, 7, 5, 1} =$

$\pm\frac{25}{35}, \pm\frac{25}{7}, \pm\frac{25}{5}, \pm\frac{25}{1}, \pm\frac{5}{35}, \pm\frac{5}{7}, \pm\frac{5}{5}, \pm\frac{5}{1},$

$\pm\frac{1}{35}, \pm\frac{1}{7}, \pm\frac{1}{5}, \pm\frac{1}{1} =$

$\pm 1, \pm 5, \pm 25, \pm\frac{1}{5}, \pm\frac{1}{7}, \pm\frac{1}{35}, \pm\frac{5}{7}, \pm\frac{25}{7} =$

possible ~~ration~~ roots

112.

$f(x) = 1x^3 + 2x^2 - 5x - 6 = 0$

112

$\frac{\text{Last}}{\text{first}} =$

$\frac{\pm 6}{1} =$

$\frac{\pm 6, \pm 3, \pm 2, \pm 1}{1} =$

$\frac{\pm 6}{1} \quad \frac{\pm 3}{1} \quad \frac{\pm 2}{1} \quad \frac{\pm 1}{1} =$

$\pm 6, \pm 3, \pm 2, \pm 1$ Possible rational roots

$$\begin{array}{r|rrrr} -1 & 1 & 2 & -5 & -6 \\ & & -1 & -1 & 6 \\ \hline & 1 & 1 & -6 & 0 \end{array}$$ rem

use synthetic division

$x^2 + x - 6 = 0$

$(x-2)(x+3) = 0$

set $x - 2 = 0$ OR $x + 3 = 0$

$x - \cancel{2} + \cancel{2} = 0 + 2$ OR $x + \cancel{3} - \cancel{3} = 0 - 3$

$x = 2$ OR $x = -3$

$\{-1, 2, -3\}$

113

$$f(x) = 1x^4 + x^3 - 11x^2 - 9x + 18$$

113

$$\frac{\text{Last}}{\text{first}} =$$

$$\frac{\pm 18}{1} =$$

$$\frac{\pm 18, \pm 9, \pm 6, \pm 3, \cancel{\pm 1}}{1} =$$

$$\frac{\pm 18}{1}, \frac{\pm 9}{1}, \frac{\pm 6}{1}, \frac{\pm 3}{1}, \pm\frac{1}{1} =$$

$$\pm 18, \pm 9, \pm 6, \pm 3, \pm 1$$ Possible rational roots

$$\begin{array}{r|rrrrr} 1 & 1 & 1 & -11 & -9 & 18 \\ & & 1 & 2 & -9 & -18 \\ \hline & 1 & 2 & -9 & -18 & 0 \end{array}$$ rem

$$\begin{array}{r|rrrr} -2 & 1 & 2 & -9 & -18 \\ & & -2 & 0 & 18 \\ \hline & 1 & 0 & -9 & 0 \end{array}$$ rem

formula $a^2 - b^2 = (a+b)(a-b)$

$$x^2 + 0x - 9 = 0$$

$$x^2 - 9 = 0$$

$$(x+3)(x-3) = 0$$

$x+3=0$ OR $x-3=0$

$x+3-3 = 0-3$ OR $x-3+3 = 0+3$

$x = -3$ OR $x = 3$

$$\{1, -2, -3, 3\}$$

114. find bounds

114

$f(x) = x^4 - 8x^2 - 9$

$x^4 - 8x^2 - 9 = 0$

$(x^2+1)(x^2-9) = 0$

$x^2+1=0$ OR $x^2-9=0$

$x^2=-1$ OR $x^2=9$

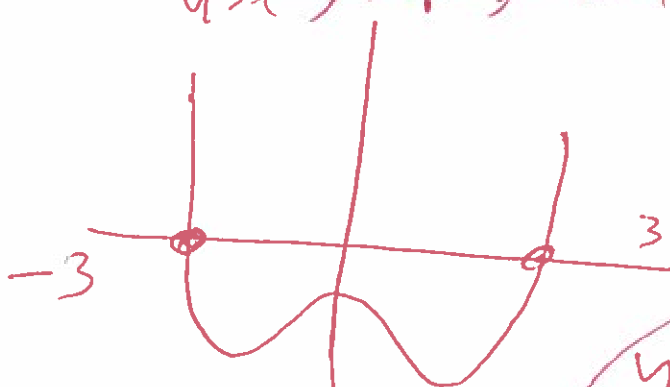
$\sqrt{x^2} = \pm\sqrt{-1}$ OR $\sqrt{x^2} = \pm\sqrt{9}$

$x = \pm i$ OR $x = \pm 3$

bounds are

$x = -3$ OR $x = 3$

use graphing calculator



$y_1 = x^4 - 8x^2 - 9$

(115) use the intermediate Value Theorem to show that the polynomial function has a zero in the given interval. [-2,0]

115

$f(x) = 12x^4 - 4x^2 + 7x - 1$

$f(-2) = 12(-2)^4 - 4(-2)^2 + 7(-2) - 1$

$f(-2) = 12(-2)(-2)(-2)(-2) - 4(-2)(-2) + 7(-2) - 1$

$f(-2) = 12(16) - 4(4) + 7(-2) - 1$

$f(-2) = 192 - 16 - 14 - 1$

$f(-2) = 161$ ✓

$f(0) = 12(0)^4 - 4(0)^2 + 7(0) - 1$

$f(0) = 12(0)(0)(0)(0) - 4(0)(0) + 7(0) - 1$

$f(0) = 0 - 0 + 0 - 1$

$f(0) = -1$ ✓

Since $f(-2) = 161$ and $f(0) = -1$
f has a zero in the given interval

YES

116 $f(x) = \sqrt{x+4}$ $g(x) = \frac{5}{x}$

116

$(f \circ g)(x) =$

$f(g(x)) =$

$f\left(\frac{5}{x}\right) =$

$\sqrt{\left(\frac{5}{x}\right) + 4} =$

$\sqrt{\frac{5}{x} + 4} =$

117 evaluate

x	-3	-2	-1	0	1	2	3
$f(x)$	-6	-4	-2	-1	2	4	6
$g(x)$	9	3	0	-1	0	3	9

117

$(f \circ g)(1) =$
$f(g(1)) =$
$f(0) =$
$-1 =$

$(g \circ f)(0) =$
$g(f(0)) =$
$g(-1) =$
$0 =$

$(f \circ g)(-1) =$
$f(g(-1)) =$
$f(0) =$
$-1 =$

$(g \circ g)(-2) =$
$g(g(-2)) =$
$g(3) =$
$9 =$

$(g \circ f)(-1) =$
$g(f(-1)) =$
$g(-2) =$
$3 =$

$(f \circ f)(-1) =$
$f(f(-1)) =$
$f(-2) =$
$-4 =$

118. $f(x) = 2x$ and $g(x) = 5x^2+5$

$$(f \circ g)(4) =$$
$$f(g(4)) =$$
$$f(5(4)^2+5) =$$
$$f(5(16)+5) =$$
$$f(80+5) =$$
$$f(85) =$$
$$2(85) =$$
$$170 =$$

$$(g \circ f)(2) =$$
$$g(f(2)) =$$
$$g(2(2)) =$$
$$g(4) =$$
$$5(4)^2+5 =$$
$$5(4)(4)+5 =$$
$$5(16)+5 =$$
$$80+5 =$$
$$85 =$$

$$(f \circ f)(1) =$$
$$f(f(1)) =$$
$$f(2(1)) =$$
$$f(2) =$$
$$2(2) =$$
$$4 =$$

$$(g \circ g)(0) =$$
$$g(g(0)) =$$
$$g(5(0)^2+5) =$$
$$g(5(0)(0)+5) =$$
$$g(0+5)$$
$$g(5) =$$
$$5(5)^2+5 =$$
$$5(5)(5)+5 =$$
$$5(25)+5 =$$
$$125+5 =$$
$$130 =$$

118

119 $f(x) = 7x - 3$ and $g(x) = \frac{1}{7}(x+3)$

119

$(f \circ g)(x)$

$f(g(x)) =$

$f(\frac{1}{7}(x+3)) =$

$7(\frac{1}{7}(x+3)) - 3 =$

$\frac{7}{7}(x+3) - 3 =$

$1(x+3) - 3 =$

$x + \cancel{3} - \cancel{3} =$

$x =$

$(g \circ f)(x) =$

$g(f(x)) =$

$g(7x-3) =$

$\frac{1}{7}((7x-3)+3) =$

$\frac{1}{7}(7x - \cancel{3} + \cancel{3}) =$

$\frac{1}{7}(7x) =$

$\frac{\cancel{7}x}{\cancel{7}} =$

$x =$

YES

$(f \circ g)(x) = (g \circ f)(x)$

120. Is this a one to one function

$\{(4, 9), (5, 9) (-9, 14) (6, -8)\}$

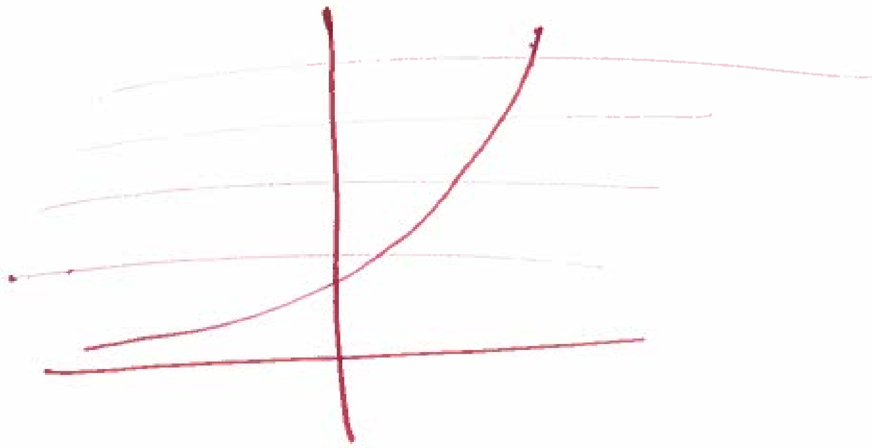
(12)

NO

Not one to one since

(4, 9) and (5, 9)

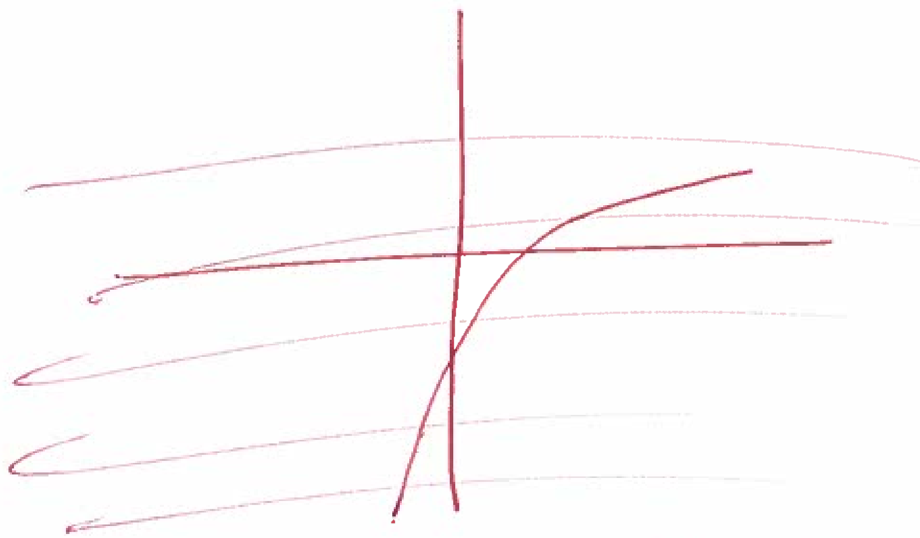
121 Is this a one to one function? 121



Yes since all horizontal lines cross on only one point

122 Is this a one to one function?

122.



YES since all horizontal lines cross on only one point.

(123) $f(x) = 8x-2$ find the inverse

(123)

$y = 8x-2$

$x = 8y-2$ rewrite

$x+2 = 8y\cancel{-2}\cancel{+2}$

$x+2 = 8y$

$\frac{x+2}{8} = \frac{\cancel{8}y}{\cancel{8}}$

inverse

$\frac{x+2}{8} = y$

$f^{-1}(x) = \frac{x+2}{8}$

124 $f(x) = x^3 + 5$ find the inverse.

124

$y = x^3 + 5$

$x = y^3 + 5$

$x - 5 = y^3 + 5 - 5$

$x - 5 = y^3$

$\sqrt[3]{x-5} = \sqrt[3]{y^3}$

$\sqrt[3]{x-5} = y$

Inverse

$f^{-1}(x) = \sqrt[3]{x-5}$

125. $f(x) = \frac{1}{x-7}$ find the inverse.

125

$$y = \frac{1}{x-7}$$

$$\frac{x}{1} = \frac{1}{y-7}$$

$x(y-7) = 1(1)$ cross mult

$$xy - 7x = 1$$

$$xy \cancel{-7x} \cancel{+7x} = 1 + 7x$$

$$xy = 1 + 7x$$

$$\frac{\cancel{x}y}{\cancel{x}} = \frac{1+7x}{x}$$

$$y = \frac{1+7x}{x}$$

inverse

$$f^{-1}(x) = \frac{1+7x}{x}$$

126

$18^{3.14} =$

$8740.890224 =$

$18^{3.141} =$

$8766.191194 =$

$18^{3.1415} =$

$8778.869128 =$

$18^{\pi} =$

$8781.22045\ 3$

126

127.

$$4^{-x} = 256$$

$$4^{-x} = \cancel{4}^{4}$$

$$-x = 4$$

$$\frac{-x}{-1} = \frac{4}{-1}$$

$$x = -4$$

127.

~~formula~~

$$a^x = a^y$$

$$x = y$$

128.

$$4^{4x+1} = 64$$

$$(4)^{4x+1} = (4)^3$$

$$4x+1 = 3$$

$$4x + \cancel{1} - \cancel{1} = 3 - 1$$

$$4x = 2$$

$$\frac{\cancel{4}x}{\cancel{4}} = \frac{2}{4}$$

$$x = \frac{2}{4}$$

$$x = \frac{\cancel{2}(1)}{\cancel{2}(2)}$$

$$x = \frac{1}{2}$$

formula

$$a^x = a^y$$

$$x = y$$

128

129

$$64^{-x+39} = 128^{x}$$

$$(2^{6})^{-x+39} = (2^{7})^{x}$$

$$\cancel{2}^{-6x+234} = \cancel{2}^{7x}$$

$$-6x + 234 = 7x$$

$$-6x + \cancel{234} - \cancel{234} = 7x - 234$$

$$-6x = 7x - 234$$

$$-6x - 7x = \cancel{7x} - 234 - \cancel{7x}$$

$$-13x = -234$$

$$\frac{\cancel{-13}x}{\cancel{-13}} = \frac{-234}{-13}$$

$$x = 18$$

129

formula

$$a^{x} = a^{y}$$

$$x = y$$

130

$P(n) = 100(0.92)^n$

130

$P(25) = 100(0.92)^{25}$

$P(25) = 100(.1243642868)$

$P(25) = 12.43642868$ OR

$P(25) = 12$ round

$P(30) = 100(0.92)^{30}$

$P(30) = 100(.0819662036)$

$P(30) = 8.19662036$

OR ~~round~~

$P(30) = 8$

131 $P(t) = 100(0.2)^t$

$P(1) = 100(0.2)^1$

$P(1) = 100(0.2)$

$P(1) = 20$

$P(3) = 100(0.2)^3$

$P(3) = 100(.008)$

$P(3) = 0.8$

131

132

132

$D(h) = 2e^{-0.14h}$

$D(1) = 2e^{-0.14(1)}$

$D(1) = 2e\wedge(-0.14(1))$

$D(1) = 1.73871647 1$

OR Round

$D(1) = 1.74$

$D(7) = 2e^{-0.14(7)}$

$D(7) = 2e\wedge(-0.14(7))$

$D(7) = .7506221977$

OR Round

$D(7) = 0.75$

133 Change the exponential Statement to an equivalent Statement involving a logarithm

133

$$8 = 2^3$$

$$\log_2(8) = 3$$

134 Change the exponential Statement to an equivalent Statement involving a logarithm.

134

$$e^x = 13$$

$$\ln(13) = x$$

$$\log_e(13) = x$$

135. Change the logarithmic statement to an equivalent statement involving an exponent.

$$\log_9(6561) = x$$

$$9^x = 6561$$

135.

136. Find the domain

$f(x) = \ln(x+3)$

set $x+3 > 0$

$x+3-3 > 0-3$

$x > -3$

$(-3, \infty)$

136.

domain

$f(x) = \ln(Ax+B)$

set $Ax+B > 0$

137.

$$5e^{0.5x} = 2$$

$$\frac{5e^{0.5x}}{5} = \frac{2}{5}$$

$$e^{0.5x} = 0.4$$

$$\ln(e^{0.5x}) = \ln(0.4)$$

$$0.5x \ln(e) = \ln(0.4)$$

$$0.5x\,(1) = \ln(0.4)$$

$$0.5x = \ln(0.4)$$

$$\frac{\cancel{0.5}x}{\cancel{0.5}} = \frac{\ln(0.4)}{0.5}$$

$$x = \frac{\ln(0.4)}{0.5}$$

OR

$$x = -1.832581464$$

137.

formula

$\ln(e) = 1$

$\ln(A^N) = N\ln(A) =$

138

138

$$2\cdot(10^{7-x})=5$$

$$\frac{\cancel{2}\cdot(10^{7-x})}{\cancel{2}}=\frac{5}{2}$$

$$10^{7-x}=\frac{5}{2}$$

$$\log(10^{7-x})=\log\left(\frac{5}{2}\right)$$

$$(7-x)\log(10)=\log\left(\frac{5}{2}\right)$$

$$(7-x)(1)=\log\left(\frac{5}{2}\right)$$

$$7-x=\log\left(\frac{5}{2}\right)$$

$$\cancel{7}-x-\cancel{7}=\log\left(\frac{5}{2}\right)-7$$

$$-x=\log\left(\frac{5}{2}\right)-7$$

$$-1(-x)=-1\left(\log\left(\frac{5}{2}\right)-7\right)$$

$$x=-\log\left(\frac{5}{2}\right)+7$$

$$x=7-\log\left(\frac{5}{2}\right)$$

OR

$$x=6.602059991$$

formula

$$\log(10)=1$$

$$\log(A^N)=N\log(A)=$$

139. Write as a single log 139.

$\log_a(P) - \log_a(Q) + 6\log_a(r) =$

$\log_a\left(\frac{P}{Q}\right) + 6\log_a(r) =$

$\log_a\left(\frac{P}{Q}\right) + \log_a(r^6) =$

$\log_a\left(\frac{P}{Q} \cdot r^6\right) =$

$\log_a\left(\frac{Pr^6}{Q}\right) =$

formula →

$\log(A) - \log(B) = \log\left(\frac{A}{B}\right)$

$\log(A^N) = N\log(A)$

$\log(A) + \log(B) = \log(AB)$

140 Expand

140

$$\log\left(\frac{X(X+5)}{(X+3)^9}\right) =$$

$$\log(X(X+5)) - \log(X+3)^9 =$$

$$\log(X) + \log(X+5) - \log(X+3)^9 =$$

$$\log(X) + \log(X+5) - 9\log(X+3) =$$

formula

$$\log\left(\frac{A}{B}\right) = \log(A) - \log(B)$$

$$\log(AB) = \log(A) + \log(B)$$

$$\log(A^N) = N\log(A)$$

141 Solve 141

$2\log_2(x-4)+\log_2(2)=5$

$2\log_2(x-4)+1=5$

$2\log_2(x-4)+\cancel{1}-\cancel{1}=5-1$

$2\log_2(x-4)=4$

formula

$\log_b(b)=1$

$\frac{\cancel{2}\log_2(x-4)}{\cancel{2}}=\frac{4}{2}$

$\log_2(x-4)=2$

$2^2=x-4$ rewrite

$4=x-4$

$4+4=x-\cancel{4}+\cancel{4}$

$8=x$

$\{8\}$

ck

$2\log_2(8-4)+\log_2(2)=5$

$2\log_2(4)+\log_2(2)=5$

Good Good Good

142

Solve

$\log(x) + \log(x-3) = 1$

$\log(x)(x-3) = 1$

$\log_{10}(x)(x-3) = 1$

$10^1 = x(x-3)$

$10 = x^2 - 3x$

$0 = x^2 - 3x - 10$

$0 = (x+2)(x-5)$

and $x+2=0$ or $x-5=0$

$x+\cancel{2}-\cancel{2} = 0-2$ or $x-\cancel{5}+\cancel{5} = 0+5$

$\cancel{x=-2}$ or $x=5$

ck

$\log(-2) + \log(-2-3) = 1$

$\log(-2) + \log(-5) = 1$

BAD BAD

ck $\log(5) + \log(5-3) = 1$

$\log(5) + \log(2) = 1$

Good Good

$\{5\}$

142

Formula

$\log(A) + \log(B) = \log(AB)$

143.

Solve

143

$\log(2x+7) = 1 + \log(x-2)$

$\log(2x+7) - \log(x-2) = 1$

$\log\left(\frac{2x+7}{x-2}\right) = 1$

$\log_{10}\left(\frac{2x+7}{x-2}\right) = 1$

formula
$\log(A) - \log(B) =$
$\log\left(\frac{A}{B}\right) =$

$10^1 = \frac{2x+7}{x-2}$

$\frac{10}{1} = \frac{2x+7}{x-2}$

$10(x-2) = 1(2x+7)$ cross mult

$10x - 20 = 2x + 7$

$10x - \cancel{20} + \cancel{20} = 2x + 7 + 20$

$10x = 2x + 27$

$10x - 2x = \cancel{2x} + 27 - \cancel{2x}$

$8x = 27$

$\frac{\cancel{8}x}{\cancel{8}} = \frac{27}{8}$

$x = \frac{27}{8}$

ok

$\log(2(\frac{27}{8})+7) = 1 + \log(\frac{27}{8} - 2)$

$\log(\frac{54}{8} + 7) = 1 + \log(\frac{27}{8} - 2)$

$\log(6.75 + 7) = 1 + \log(3.375 - 2)$

$\log(13.75) = 1 + \log(1.375)$

Good Good

144

Week x	Weight y (grams)
0	100.0
1	80.5
2	63.0
3	52.4
4	40.7
5	32.5
6	26.0

144

Stat, Edit, L1, L2, Stat, Calc, ExpReg,

$y = ab^x$

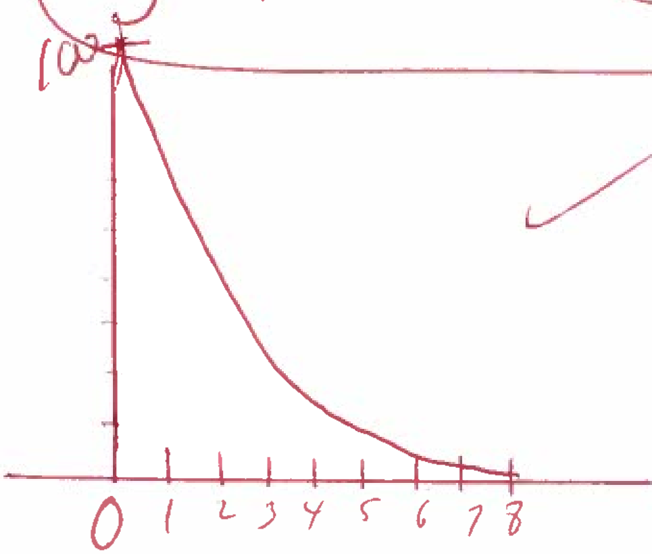
$a = 100.3429214$

$b = .7987397842$

$y = 100.3429214(.7987397842)^x$

OR

$y = 100.3429e^{-0.2248x}$



(30, 0.12)

(10.3, 10)

145

$x + y = 5$
$x - y = 3$

$2x + 0 = 8$

$2x = 8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

Subst

$x + y = 5$

$(4) + y = 5$

$4 + y - 4 = 5 - 4$

$y = 1$

$(x, y) = (4, 1)$

145.

$x + y = 5$ solve for y

$\cancel{x} + y \cancel{- x} = 5 - x$

$y = 5 - x$

x	y
0	5
4	1

$y = 5 - (0)$

$y = 5 - 0$

$y = 5$

$y = 5 - (4)$

$y = 5 - 4$

$y = 1$

Solve for y

x	y
0	-3
4	1

$x - y = 3$

$\cancel{x} - y \cancel{- x} = 3 - x$

$-y = 3 - x$

$-1(-y) = -1(3 - x)$

$y = -3 + x$

$y = -3 + (0)$

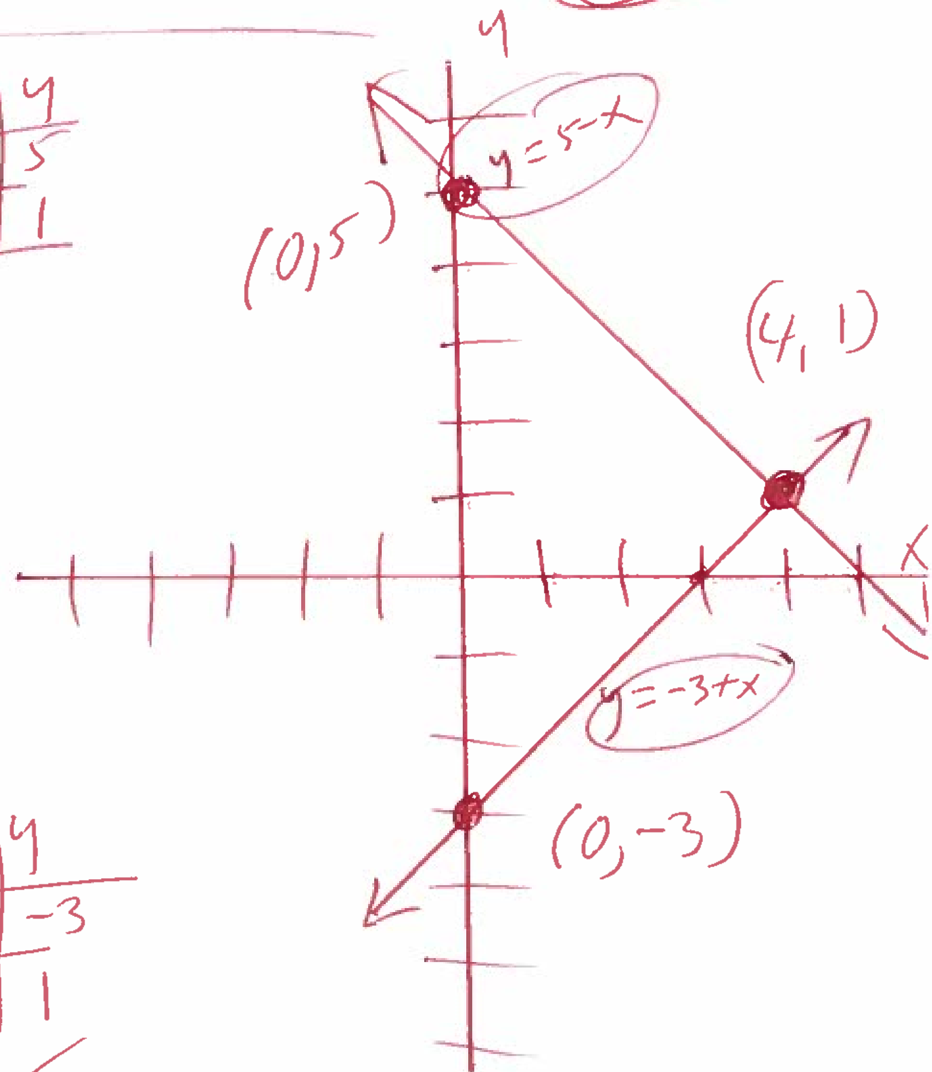
$y = -3 + 0$

$y = -3$

$y = -3 + x$

$y = -3 + 4$

$y = 1$



146

$x + 2y = 10$
$4x + 8y = 40$

$(x + 2y = 10)\,(-8)$ Mult
$(4x + 8y = 40)\,(2)$

$-8x - 16y = -80$
$8x + 16y = 80$

$0 + 0 = 0$

$0 = 0$

146

There are infinitely many solutions.

$\{(x, y) \mid x = -2y + 10\}$

147.

$$x - y = 2$$
$$2x - 4z = 8$$
$$2y + z = 4$$

147.

$$x - y + 0 = 2$$
$$2x + 0 - 4z = 8$$
$$0 + 2y + z = 4$$

rewrite

2ND, Matrix, Edit, [A], 3x4,

$$[A] = \begin{bmatrix} 1 & -1 & 0 & 2 \\ 2 & 0 & -4 & 8 \\ 0 & 2 & 1 & 4 \end{bmatrix}$$

2ND Quit

2ND, matrix, math, rref( ), enter

2nd matrix

rref([A])

$$\begin{array}{cc} \begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \end{bmatrix} & \begin{matrix} x \\ y \\ z \end{matrix} \end{array}$$

$$(x, y, z) = (4, 2, 0)$$

148

$x - y - z = 1$
$-x + 2y - 3z = -4$
$3x - y - 11z = -3$

149

2ND, matrix, edit [A], 3x4

$$[A] = \begin{bmatrix} 1 & -1 & -1 & 1 \\ -1 & 2 & -3 & -4 \\ 3 & -1 & -11 & -3 \end{bmatrix}$$

2ND Quit

2ND, matrix, math, rref( ), enter
2ND matrix

rref([A]) =

$$\begin{bmatrix} 1 & 0 & -5 & -2 \\ 0 & 1 & -4 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

There are infinitely many solutions

$\{(x, y, z) \mid x = 5z - 2,\ y = 4z - 3\}$

149

$x+y-z=5$
$3x-2y+z=6$
$x+7y-4z=14$

149

2ND, matrix, math, Edit, [A], 3x4

$$[A]=\begin{bmatrix}1 & 1 & -1 & 5\\ 3 & -2 & 1 & 6\\ 1 & 7 & -4 & 14\end{bmatrix}$$

2ND Quit

2ND, matrix, math, rref( ), enter

$$rref([A])=$$

$$\begin{array}{cc}\begin{bmatrix}1 & 0 & 0 & 3\\ 0 & 1 & 0 & 1\\ 0 & 0 & 1 & -1\end{bmatrix} & \begin{matrix}x\\ y=\\ z\end{matrix}\end{array}$$

$(x,y,z)=(3,1,-1)$