

Student: _____
Date: _____

Instructor: Alfredo Alvarez
Course: Math 1314 Alvarez

Assignment:
M1314COFIESTAFINALPRACTICE025RR

08-03-19
08-05-19

08-21-19
08-23-19

1. Solve the equation by factoring.

$$24 - 24x = (5x + 1)(x - 1)$$

The solution set is { }.

(Use a comma to separate answers as needed.)

Answer: 1, -5

ID: 1.5.13

2. Solve the equation by the method of your choice.

$$2x^2 - 13x = 7$$

The solution set is { }.

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

Answer: 7, $-\frac{1}{2}$

ID: 1.5.83

3. Solve the given radical equation. Check all proposed solutions.

$$\sqrt{5x + 41} = x + 7$$

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

- A. The solution set is { }.
(Use a comma to separate answers as needed.)
- B. There is no solution.

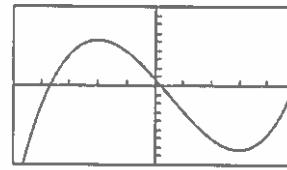
Answer: A. The solution set is { -1 }. (Use a comma to separate answers as needed.)

ID: 1.6.15

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4. The graph and equation of the function f are given.
- Use the graph to find any values at which f has a relative maximum, and use the equation to calculate the relative maximum for each value.
 - Use the graph to find any values at which f has a relative minimum, and use the equation to calculate the relative minimum for each value.

$$f(x) = 2x^3 - 3x^2 - 36x + 8$$



$[-5, 5, 1]$ by $[-90, 90, 10]$

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

- A. The function f has (a) relative maxima(maximum) at _____ and the relative maxima(maximum) are(is) _____.
(Use a comma to separate answers as needed.)
- B. The function f has no relative maxima.

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

- A. The function f has (a) relative minima(minimum) at _____ and the relative minima(minimum) are(is) _____.
(Use a comma to separate answers as needed.)
- B. The function f has no relative minima.

Answers A.

The function f has (a) relative maxima(maximum) at and the relative maxima(maximum) are(is) .
(Use a comma to separate answers as needed.)

A.

The function f has (a) relative minima(minimum) at and the relative minima(minimum) are(is) .
(Use a comma to separate answers as needed.)

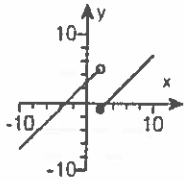
ID: 2.2.15

5. The domain of the piecewise function is $(-\infty, \infty)$.
 a. Graph the function.
 b. Use your graph to determine the function's range.

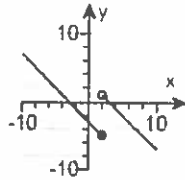
$$f(x) = \begin{cases} x + 3 & \text{if } x < 2 \\ x - 3 & \text{if } x \geq 2 \end{cases}$$

a. Choose the correct graph below.

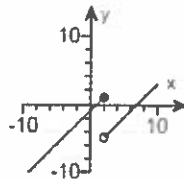
A.



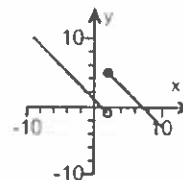
B.



C.

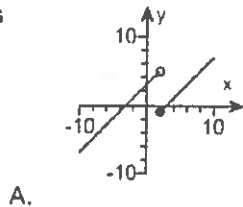


D.



- b. The range of $f(x)$ is . (Type your answer in interval notation.)

Answers



A.

$(-\infty, \infty)$

ID: 2.2.47

6. Find the difference quotient of f ; that is, find $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$, for the following function. Be sure to simplify.

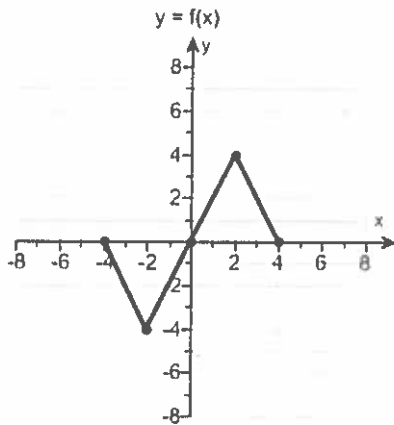
$$f(x) = x^2 - 7x + 5$$

$$\frac{f(x+h) - f(x)}{h} = \text{[]} \text{ (Simplify your answer.)}$$

Answer: $2x + h - 7$

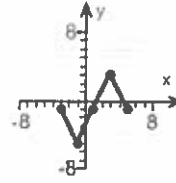
ID: 2.2.61

7. Use the graph of $y = f(x)$ to graph the function $g(x) = f(x + 1) - 1$.

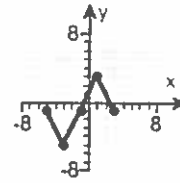


Choose the correct graph of g below.

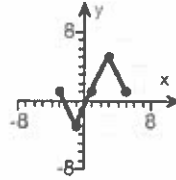
A.



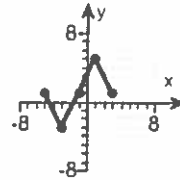
B.



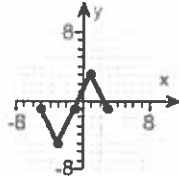
C.



D.



Answer:



B.

ID: 2.5.21

8. Find the domain of the function.

$$f(x) = \sqrt{16 - 4x}$$

What is the domain of f ?

(Type your answer in interval notation.)

Answer: $(-\infty, 4]$

ID: 2.6.23

9. For $f(x) = 2 - x$ and $g(x) = 3x^2 + x + 3$, find the following functions.

a. $(f \circ g)(x)$; b. $(g \circ f)(x)$; c. $(f \circ g)(2)$; d. $(g \circ f)(2)$

a. $(f \circ g)(x) =$

(Simplify your answer.)

b. $(g \circ f)(x) =$

(Simplify your answer.)

c. $(f \circ g)(2) =$

d. $(g \circ f)(2) =$

Answers $-3x^2 - x - 1$

$3x^2 - 13x + 17$

-15

3

ID: 2.6.59

10. Find the distance between the pair of points.

$(1,9)$ and $(13,18)$

The distance between the points is units.

(Round to two decimal places as needed.)

Answer: 15

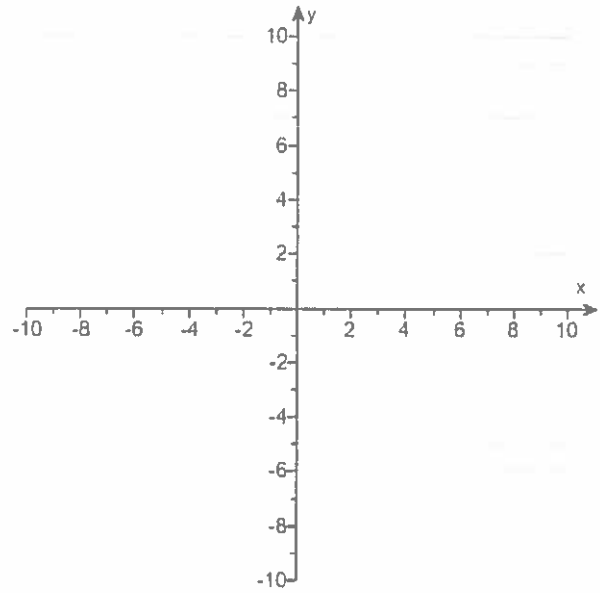
ID: 2.8.1

11. Complete the square and write the equation of the circle in standard form. Then determine the center and radius of the circle to graph the equation.

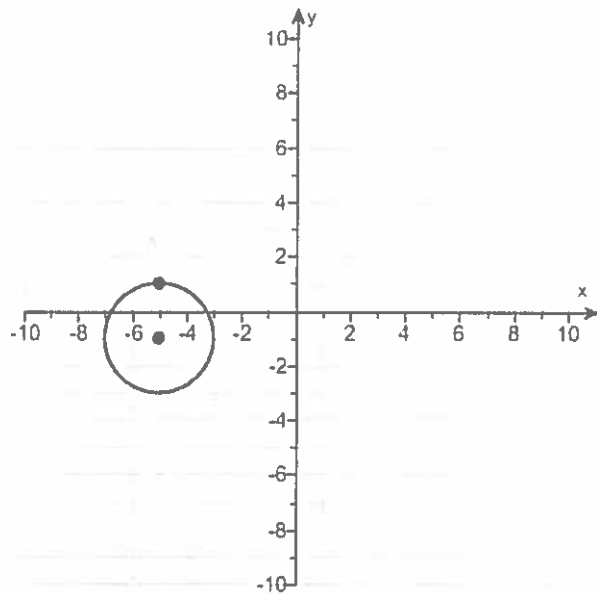
$$x^2 + y^2 + 10x + 2y + 22 = 0$$

The equation in standard form is .
(Simplify your answer.)

Use the graphing tool to graph the circle.



Answers $(x + 5)^2 + (y + 1)^2 = 4$

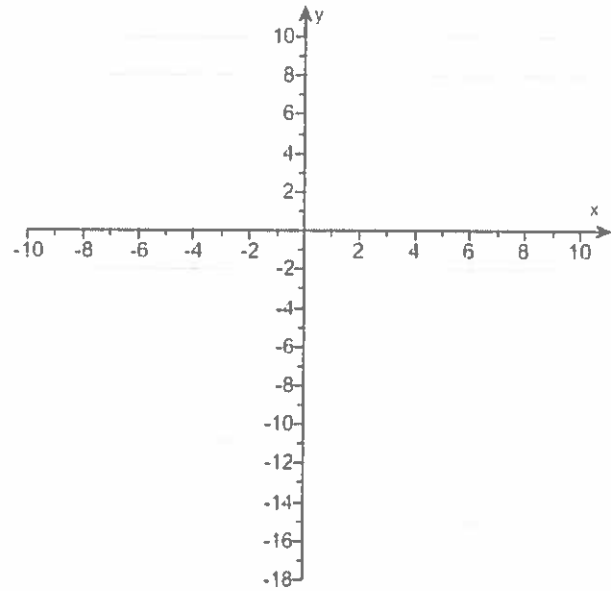


ID: 2.8.53

12. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabola's axis of symmetry. Use the graph to determine the domain and range of the function.

$$f(x) = 10x - x^2 - 16$$

Use the graphing tool to graph the equation. Use the vertex and one of the intercepts to draw the graph.

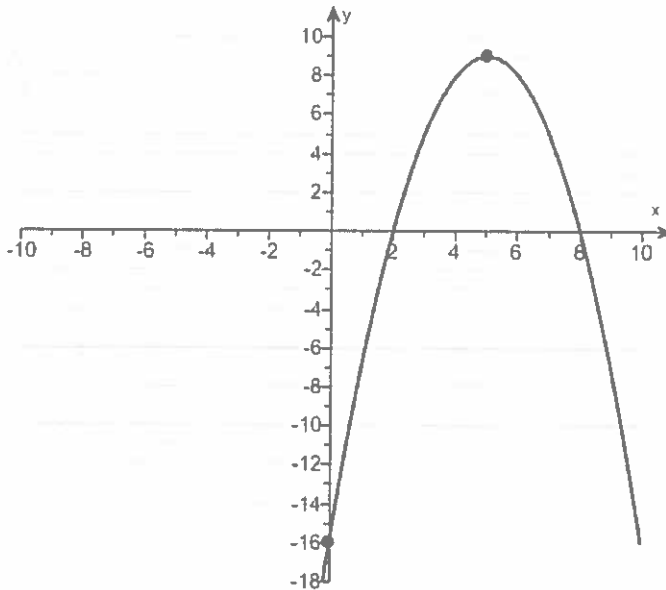


The axis of symmetry is .
(Type an equation.)

The domain of the function is .
(Type your answer in interval notation.)

The range of the function is .
(Type your answer in interval notation.)

Answers



$x = 5$
 $(-\infty, \infty)$
 $(-\infty, 9]$

ID: 3.1.31

13. Consider the function $f(x) = -3x^2 + 12x - 1$.
- Determine, without graphing, whether the function has a minimum value or a maximum value.
 - Find the minimum or maximum value and determine where it occurs.
 - Identify the function's domain and its range.

- a. The function has a (1) value.
- b. The minimum/maximum value is . It occurs at $x =$.
- c. The domain of f is . (Type your answer in interval notation.)
- The range of f is . (Type your answer in interval notation.)

- (1) maximum
 minimum

Answers (1) maximum

11

2

$(-\infty, \infty)$

$(-\infty, 11]$

ID: 3.1.41

14. The following function is given.

$$f(x) = 3x^3 - 7x^2 - 75x + 175$$

a. List all rational zeros that are possible according to the Rational Zero Theorem. Choose the correct answer below.

- A. $\pm 1, \pm 3, \pm \frac{1}{5}, \pm \frac{3}{5}, \pm \frac{1}{10}, \pm \frac{3}{10}, \pm \frac{1}{7}, \pm \frac{3}{7}, \pm \frac{1}{35}, \pm \frac{3}{35}, \pm \frac{1}{175}, \pm \frac{3}{175}$
- B. $\pm 1, \pm 5, \pm 25, \pm 7, \pm 35, \pm 175, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{25}{3}, \pm \frac{7}{3}, \pm \frac{35}{3}, \pm \frac{175}{3}$
- C. $\pm 1, \pm 3, \pm \frac{1}{5}, \pm \frac{3}{5}, \pm \frac{1}{25}, \pm \frac{3}{25}, \pm \frac{1}{7}, \pm \frac{3}{7}, \pm \frac{1}{35}, \pm \frac{3}{35}, \pm \frac{1}{175}, \pm \frac{3}{175}$
- D. $\pm 1, \pm 5, \pm 10, \pm 7, \pm 35, \pm 175, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{10}{3}, \pm \frac{7}{3}, \pm \frac{35}{3}, \pm \frac{175}{3}$

b. Use synthetic division to test several possible rational zeros in order to identify one actual zero.

One rational zero of the given function is .

(Simplify your answer.)

c. Use the zero from part (b) to find all the zeros of the polynomial function.

The zeros of the function $f(x) = 3x^3 - 7x^2 - 75x + 175$ are .

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

Answers B. $\pm 1, \pm 5, \pm 25, \pm 7, \pm 35, \pm 175, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{25}{3}, \pm \frac{7}{3}, \pm \frac{35}{3}, \pm \frac{175}{3}$

$$\frac{7}{3}$$

$$\frac{7}{3}, 5, -5$$

ID: 3.4.11

15. Find the vertical asymptotes, if any, and the values of x corresponding to holes, if any, of the graph of the rational function.

$$h(x) = \frac{x+3}{x(x+4)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice. (Type an equation. Use a comma to separate answers as needed.)

- A. There are no vertical asymptotes but there is(are) hole(s) corresponding to _____.
- B. The vertical asymptote(s) is(are) _____ and hole(s) corresponding to _____.
- C. The vertical asymptote(s) is(are) _____. There are no holes.
- D. There are no discontinuities.

Answer: C. The vertical asymptote(s) is(are) . There are no holes.

ID: 3.5.23

16. Find the horizontal asymptote, if any, of the graph of the rational function.

$$g(x) = \frac{18x^2}{9x^2 + 1}$$

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

- A. The horizontal asymptote is _____. (Type an equation.)
- B. There is no horizontal asymptote.

Answer: A. The horizontal asymptote is . (Type an equation.)

ID: 3.5.39

17. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$$\ln \left[\frac{x^8 \sqrt{x^2 + 6}}{(x+6)^6} \right]$$

$$\ln \left[\frac{x^8 \sqrt{x^2 + 6}}{(x+6)^6} \right] = \text{_____}$$

Answer: $8 \ln x + \frac{1}{2} \ln (x^2 + 6) - 6 \ln (x + 6)$

ID: 4.3.37

18. Solve the following exponential equation by expressing each side as a power of the same base and then equating exponents.

$$16^{x+8} = 256^{x-6}$$

The solution set is .

Answer: 20

ID: 4.4.19

19. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\log_3(x+23) + \log_3(x+5) = 5$$

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

- A. The solution set is .
- (Simplify your answer. Use a comma to separate answers as needed.)
- B. There is no solution.

Answer: A. The solution set is .

(Simplify your answer. Use a comma to separate answers as needed.)

ID: 4.4.69

20. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\log_3(x+23) - \log_3(x-3) = 3$$

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

- A. The solution set is .
- (Simplify your answer. Use a comma to separate answers as needed.)
- B. There is no solution.

Answer: A. The solution set is .

(Simplify your answer. Use a comma to separate answers as needed.)

ID: 4.4.71

21. Complete the table for a savings account subject to continuous compounding.

$$(A = P e^{rt})$$

Amount Invested	Annual Interest Rate	Accumulated Amount	Time t in years
\$6500	3%	\$13,000	?

Let A represent the accumulated amount, P the amount invested, r the annual interest rate, and t the time. Find the time, t .

$t \approx$ years

(Round to one decimal place as needed.)

Answer: 23.1

ID: 4.4.111

22. Solve the given system of equations.

$$x + y + 2z = 9$$

$$x + y + 3z = 12$$

$$x - 5y - 2z = -9$$

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

- A. There is one solution. The solution set is $\{(\quad, \quad, \quad)\}$. (Simplify your answers.)
- B. There are infinitely many solutions.
- C. There is no solution.

Answer: A.

There is one solution. The solution set is $\{(\text{ , \text{ , \text{ })\}$. (Simplify your answers.)

ID: 5.2.5

23. Write the first four terms of the sequence whose general term is given.

$$a_n = \frac{2n}{n+1}$$

$$a_1 = \boxed{} \text{ (Simplify your answer.)}$$

$$a_2 = \boxed{} \text{ (Simplify your answer.)}$$

$$a_3 = \boxed{} \text{ (Simplify your answer.)}$$

$$a_4 = \boxed{} \text{ (Simplify your answer.)}$$

Answers 1

$$\frac{4}{3}$$

$$\frac{3}{2}$$

$$\frac{8}{5}$$

ID: 8.1.9

24. Find the indicated sum.

$$\sum_{k=1}^3 k(k+2)$$

$$\sum_{k=1}^3 k(k+2) = \boxed{} \text{ (Simplify your answer.)}$$

Answer: 26

ID: 8.1.33

25. Use the binomial theorem to expand the binomial.

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

$$(3x - 2)^3 = \boxed{} \text{ (Simplify your answer.)}$$

Answer: $27x^3 - 54x^2 + 36x - 8$

ID: 8.5.13

$$\textcircled{1} \quad 24 - 24x = (5x+1)(x-1) \quad \text{M13146 Florida Practice 025 RK}$$

$$24 - 24x = 5x^2 - 5x + 1x - 1$$

$$24 - 24x = 5x^2 - 4x - 1$$

$$0 = 5x^2 - 4x - 1 - 24 + 24x$$

$$0 = 5x^2 + 20x - 25$$

$$0 = 5(x^2 + 4x - 5)$$

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

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

$$x-1+1=0+1 \quad \text{OR} \quad x+5-5=0-5$$

$$x=1$$

$$\text{OR} \quad x=-5$$

$$(2) \quad 2x^2 - 13x = 7$$

$$2x^2 - 13x - 7 = 0$$

$$a=2, \quad b=-13, \quad c=-7$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-13) \pm \sqrt{(-13)^2 - 4(2)(-7)}}{2(2)}$$

$$x = \frac{13 \pm \sqrt{169 + 56}}{4}$$

$$x = \frac{13 \pm \sqrt{225}}{4}$$

$$x = \frac{13 \pm 15}{4}$$

$$x = \frac{13+15}{4} \quad \text{OR} \quad x = \frac{13-15}{4}$$

$$x = \frac{28}{4} \quad \text{OR} \quad x = \frac{-2}{4}$$

$$x = 7 \quad \text{OR} \quad x = \frac{2(-1)}{2(2)}$$

$$x = -\frac{1}{2}$$

Use
Quadratic
Formula

$$\textcircled{3} \quad \sqrt{5x+41} = x+7$$

$$(\sqrt{5x+41})^2 = (x+7)^2$$

$$5x+41 = (x+7)(x+7)$$

$$5x+41 = x^2 + 7x + 7x + 49$$

$$5x+41 = x^2 + 14x + 49$$

$$0 = x^2 + 14x + 49 - 5x - 41$$

$$0 = x^2 + 9x + 8$$

$$0 = (x+1)(x+8)$$

$$\text{but } x+1=0$$

OR

$$x+8=0$$

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

OR

$$x+8-8=0-8$$

$$x = -1$$

OR

$$x = -8$$

Check

$$\sqrt{5x+41} = x+7$$

$$\sqrt{5(-1)+41} = (-1)+7$$

$$\sqrt{-5+41} = -1+7$$

$$\sqrt{36} = 6$$

$$6 = 6$$

GOOD

$$\sqrt{5(-8)+41} = (-8)+7$$

$$\sqrt{-40+41} = -8+7$$

$$\sqrt{1} = -1$$

$$1 \neq -1$$

BAD

answer

$$x = -1$$

Solve

④ find relative Max or Min

$$f(x) = 2x^3 - 3x^2 - 36x + 8$$

Window

$$x - \text{min} = -5$$

$$x - \text{max} = 5$$

$$y - \text{min} = -90$$

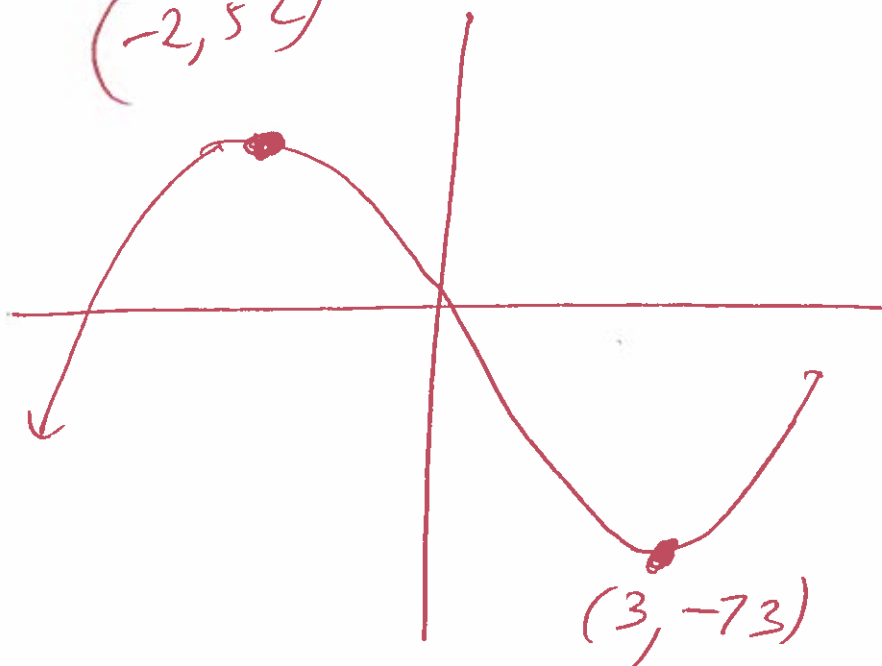
$$y - \text{max} = 90$$

Use graphing Calculator

$$y_1 = 2x^3 \overset{\text{BIG}}{\text{---}} 3x^2 \overset{\text{BIG}}{\text{---}} 36x + 8$$

relative max

$$(-2, 52)$$



$$(3, -73)$$

relative min

5. graph

$$f(x) = \begin{cases} x+3 & \div (x < 2) \\ x-3 & \div (x \geq 2) \end{cases}$$

Window

$$x\text{-min} = -12$$

$$x\text{-max} = 12$$

$$y\text{-min} = -10$$

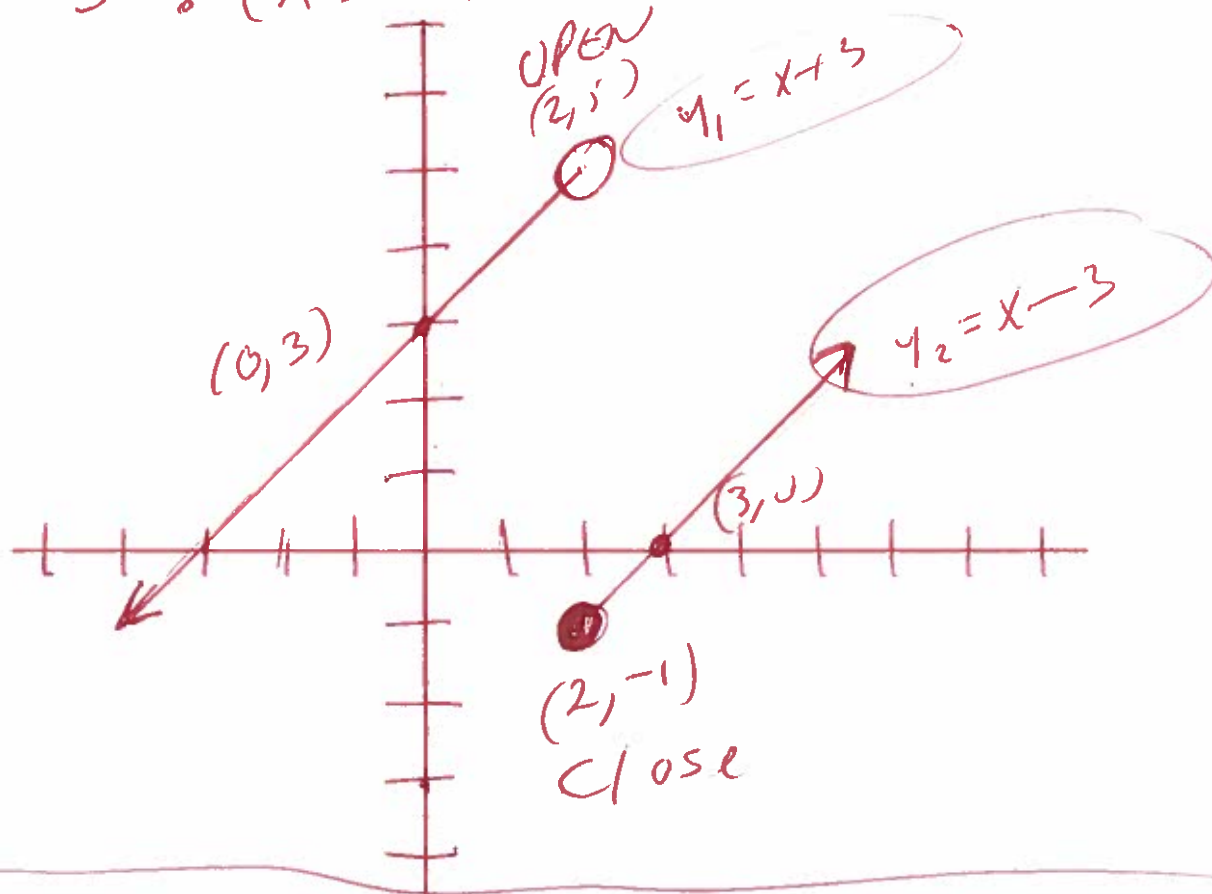
$$y\text{-max} = 10$$

Use graphing
calculator

2nd Math

$$y_1 = x+3 \div (x < 2) \text{ Open Circle}$$

$$y_2 = x-3 \div (x \geq 2) \text{ Close Circle}$$



$$\textcircled{6} \quad f(x) = x^2 - 7x + 5$$

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

$$\frac{(x+h)^2 - 7(x+h) + 5 - (x^2 - 7x + 5)}{h} =$$

$$\frac{(x+h)(x+h) - 7x - 7h + 5 - x^2 + 7x - 5}{h} =$$

$$\frac{x^2 + xh + xh + h^2 - 7x - 7h + 5 - x^2 + 7x - 5}{h} =$$

$$\frac{x^2 + 2xh + h^2 - 7x - 7h + 5 - x^2 + 7x - 5}{h} =$$

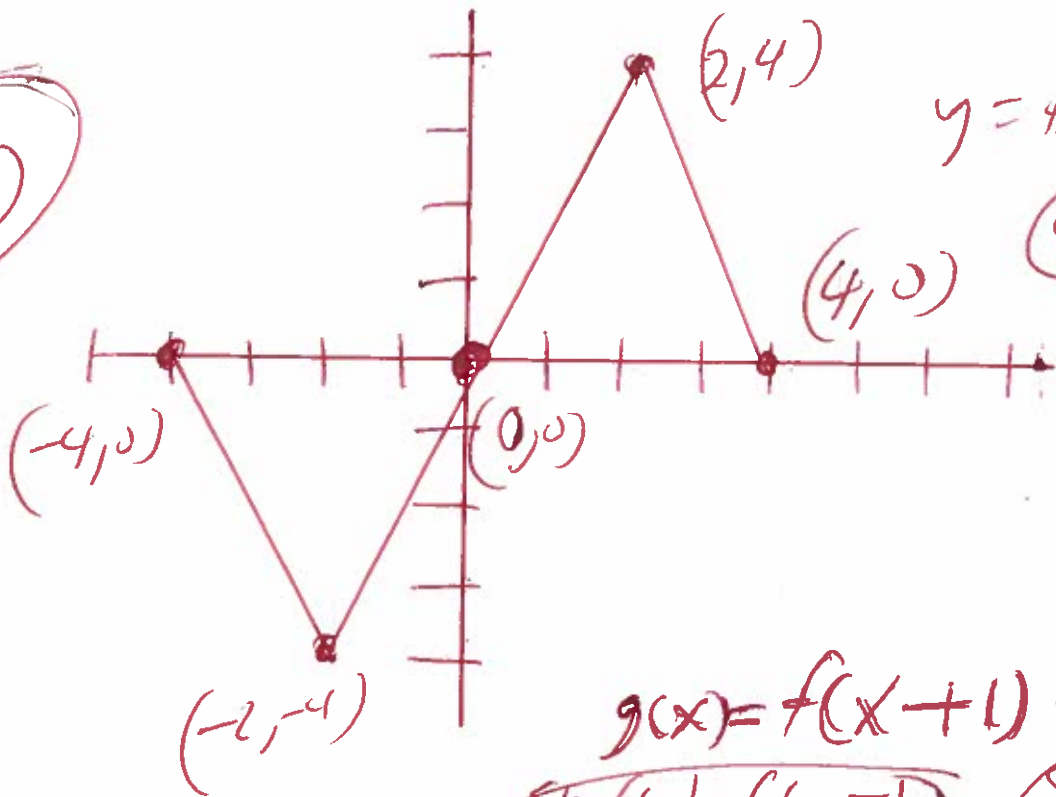
$$\frac{2xh + h^2 - 7h}{h} =$$

$$\frac{2xh}{h} + \frac{h^2}{h} - \frac{7h}{h} =$$

$$2x + h - 7 =$$

7

OLD



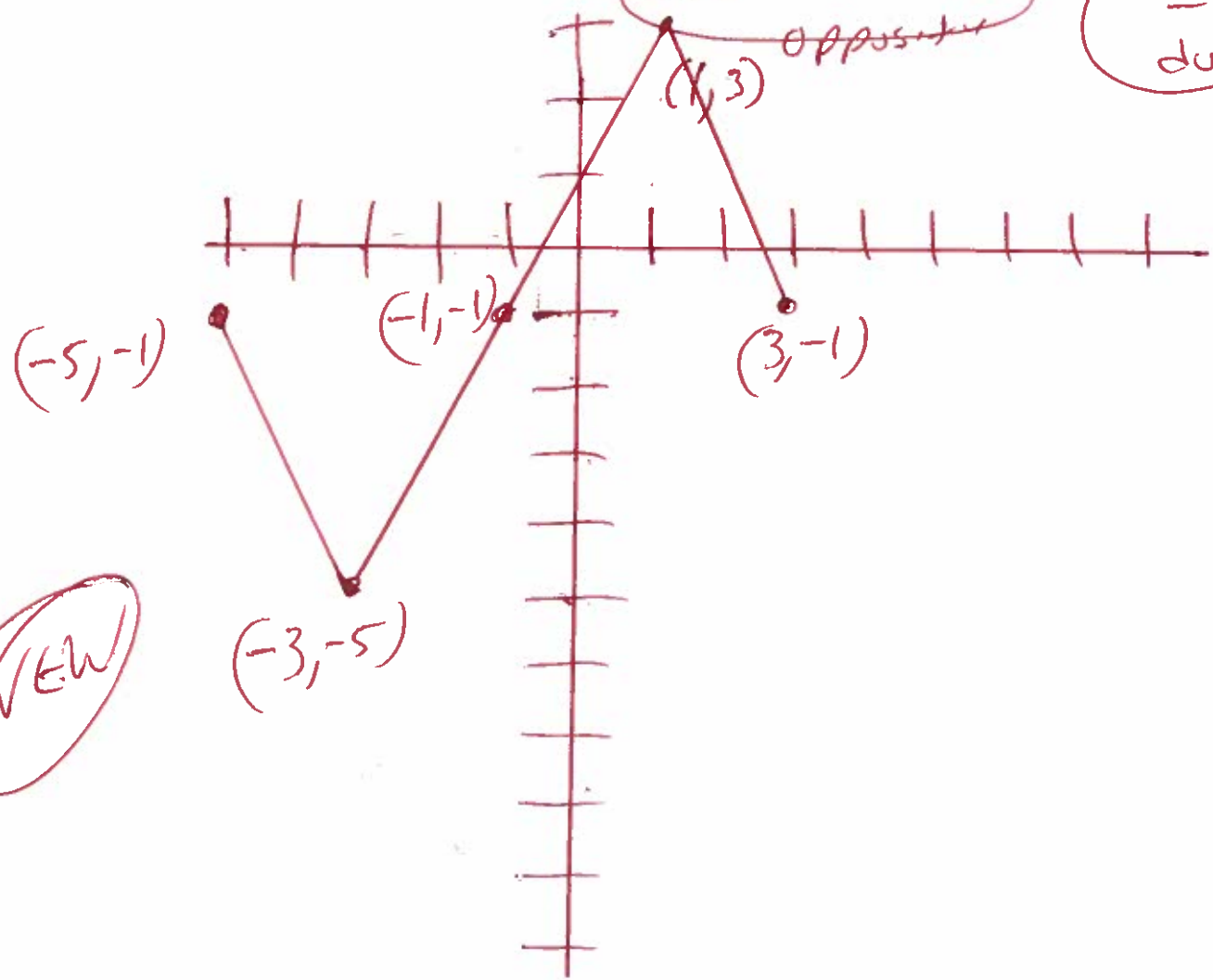
$y = f(x)$

OLD

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

Shift left -1
opposite

Shift
-1
down



NEW



8) find domain

$$f(x) = \sqrt{16-4x}$$

$$\text{let } 16-4x \geq 0$$

$$16 - 4x \geq 0 - 16$$

$$-4x \geq -16$$

$$\frac{-4x}{-4} \leq \frac{-16}{-4}$$

$$x \leq 4$$



$$(-\infty, 4]$$

formula
domain

$$f(x) = \sqrt{Ax+B}$$

let $Ax+B \geq 0$

divide by a negative
and turn all signs
around

9) $f(x) = 2 - x$ and $g(x) = 3x^2 + x + 3$

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

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

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

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

$$2 - 3x^2 - x - 3 =$$

$$\boxed{-3x^2 - x - 1 =}$$

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

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

$$g(2 - x) =$$

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

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

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

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

$$12 - 12x + 3x^2 + 2 - x + 3 =$$

$$\boxed{3x^2 - 13x + 17 =}$$

$$(f \circ g)(x) = -3x^2 - x - 1$$

$$(f \circ g)(2) = -3(2)^2 - (2) - 1$$

$$(f \circ g)(2) = -3(2)(2) - (2) - 1$$

$$(f \circ g)(2) = -12 - 2 - 1$$

$$\boxed{(f \circ g)(2) = -15}$$

$$(g \circ f)(x) = 3x^2 - 13x + 17$$

$$(g \circ f)(2) = 3(2)^2 - 13(2) + 17$$

$$(g \circ f)(2) = 3(2)(2) - 13(2) + 17$$

$$(g \circ f)(2) = 12 - 26 + 17$$

$$\boxed{(g \circ f)(2) = 3}$$

~~Composites
formulas~~

$$\del{(f \circ g)(x) = f(g(x))}$$

$$\del{(g \circ f)(x) = g(f(x))}$$

10. Find the distance

$$(1, 9) \text{ and } (13, 18)$$
$$x_1 \quad y_1 \qquad x_2 \quad y_2$$

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

$$d = \sqrt{(1 - 13)^2 + (9 - 18)^2}$$

$$d = \sqrt{(1 - 13)^2 + (9 - 18)^2}$$

$$d = \sqrt{(-12)^2 + (-9)^2}$$

$$d = \sqrt{144 + 81}$$

$$d = \sqrt{225}$$

$$d = 15$$

(11) Graph Complete the square first

$$x^2 + y^2 + 10x + 2y + 22 = 0$$

$$x^2 + 10x + y^2 + 2y = -22$$

$$x^2 + 10x + \left(\frac{1}{2}(10)\right)^2 + y^2 + 2y + \left(\frac{1}{2}(2)\right)^2 = -22 + \left(\frac{1}{2}(10)\right)^2 + \left(\frac{1}{2}(2)\right)^2$$

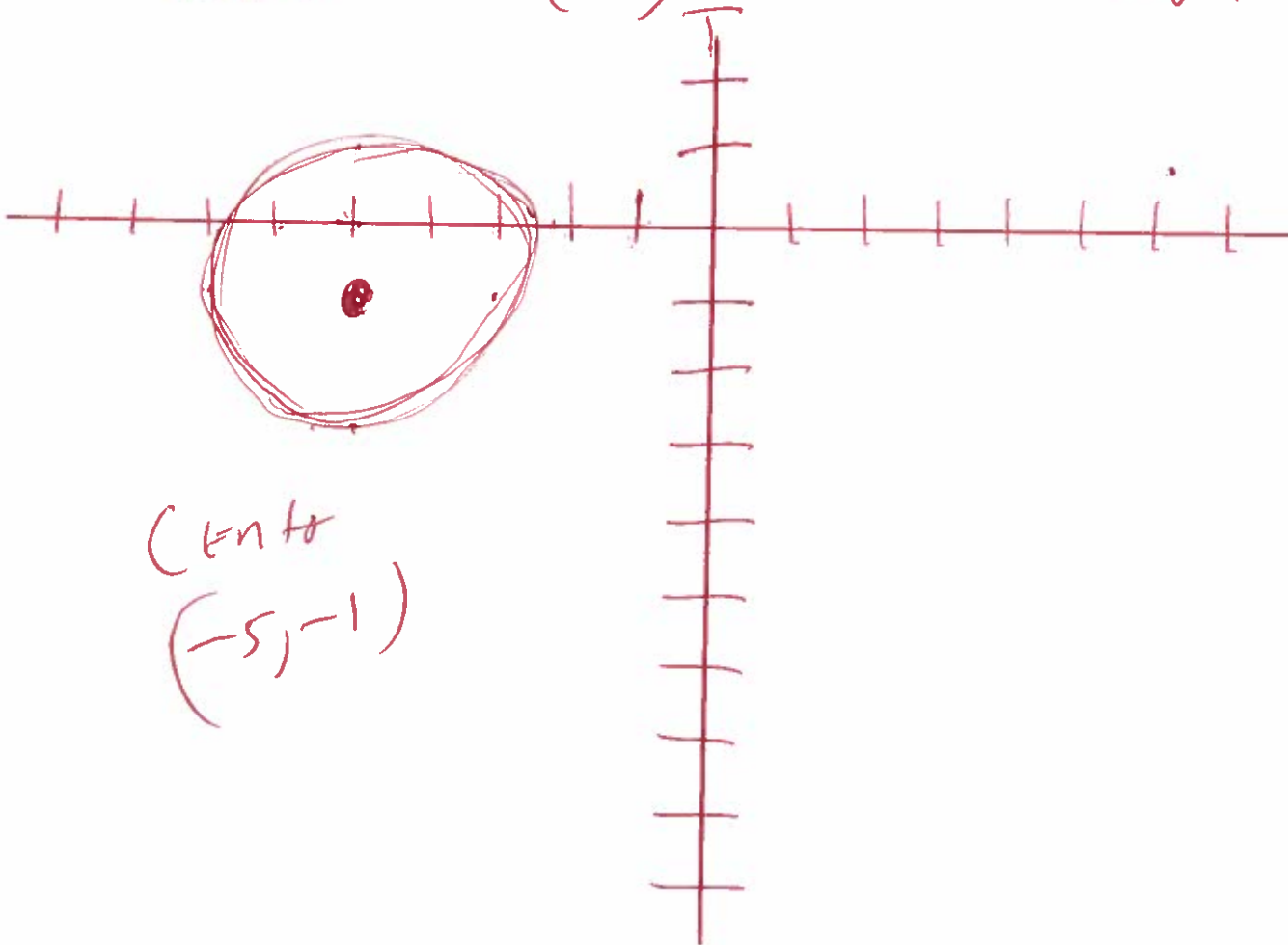
$$x^2 + 10x + (5)^2 + y^2 + 2y + (1)^2 = -22 + (5)^2 + (1)^2$$

$$x^2 + 10x + 25 + y^2 + 2y + 1 = -22 + 25 + 1$$

$$(x+5)(x+5) + (y+1)(y+1) = 4$$

$$\underset{\text{OPPOSITE}}{(x+5)}^2 + \underset{\text{OPPOSITE}}{(y+1)}^2 = 4$$

$$\text{Center} = (-5, -1) \quad \text{Radius} = \sqrt{4} = 2$$



Center
 $(-5, -1)$

12. Graph

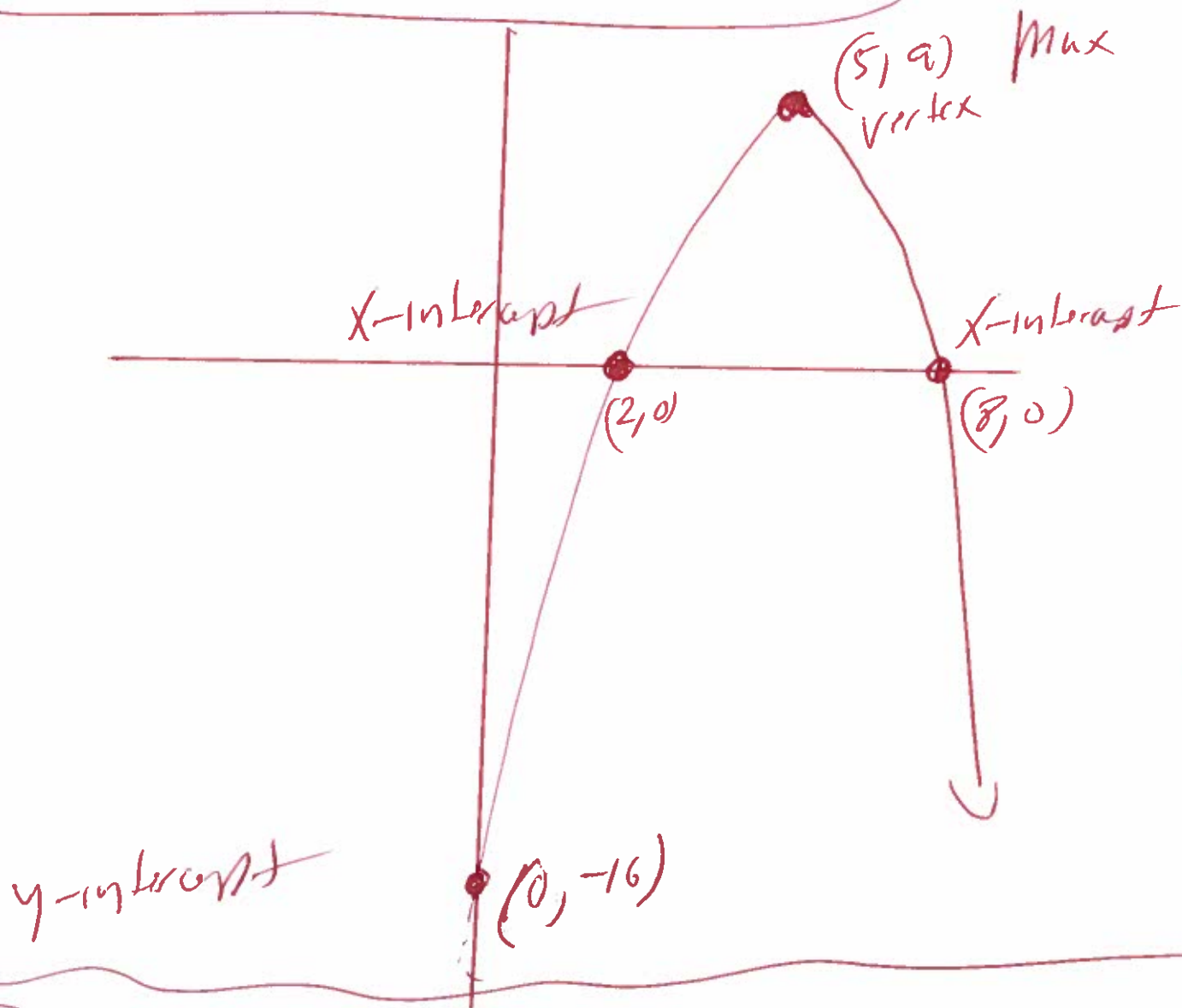
$$f(x) = 10x - x^2 - 16$$

windows

$$\begin{aligned}x\text{-min} &= -12 \\x\text{-max} &= 12 \\y\text{-min} &= -10 \\y\text{-max} &= 10\end{aligned}$$

MSR graphing calculator

$$y_1 = 10x - x^2 - 16$$



$$\textcircled{13} \quad f(x) = -3x^2 + 12x - 1$$
$$a = -3, \quad b = 12, \quad c = -1$$

Graph opens
down

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

$$\text{Vertex} = \left(-\frac{(12)}{2(-3)}, f\left(-\frac{(12)}{2(-3)}\right) \right)$$

$$\text{Vertex} = \left(\frac{-12}{-6}, f\left(\frac{-12}{-6}\right) \right)$$

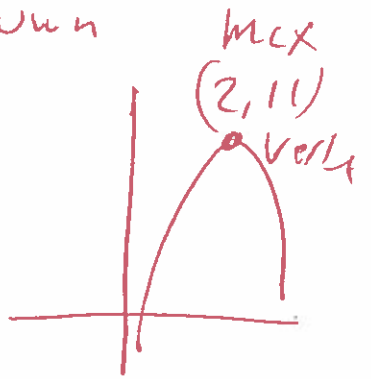
$$\text{Vertex} = (2, f(2))$$

$$\text{Vertex} = (2, -3(2)^2 + 12(2) - 1)$$

$$\text{Vertex} = (2, -3(2)(2) + 12(2) - 1)$$

$$\text{Vertex} = (2, -12 + 24 - 1)$$

$$\text{Vertex} = (2, 11)$$



Max ↗

$$\textcircled{14} f(x) = 3x^3 - 7x^2 - 75x + 175$$

possibly rational roots

$$\begin{array}{r} \text{Last} \\ \text{First} \\ \hline \pm 175 \\ \hline \pm 3 \end{array}$$

$$\pm 175, \pm 35, \pm 25, \pm 7, \pm 5, \pm 1, \pm 1, \pm 3$$

Possible rational zeros

$$\pm 1, \pm 5, \pm 7, \pm 25, \pm 35, \pm 175, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{15}{3}, \pm \frac{35}{3}, \pm \frac{175}{3}$$

Use Synthetic Division

$$\begin{array}{r} \text{Try } \curvearrowright \quad 5 \mid 3 \quad -7 \quad -75 \quad 175 \\ \quad \quad \quad 15 \quad 40 \quad -175 \\ \hline 3 \quad 8 \quad -35 \quad \textcircled{0} \text{ rem} \end{array}$$

$$3x^2 + 8x - 35 = 0$$

$$(3x - 7)(x + 5) = 0$$

$$\text{Set } 3x - 7 = 0 \quad \text{OR} \quad x + 5 = 0$$

$$3x - 7 + 7 = 0 + 7 \quad \text{OR} \quad x + 5 - 5 = 0 - 5$$

$$3x = 7$$

OR

$$x = -5$$

$$\frac{3x}{3} = \frac{7}{3}$$

$$x = \frac{7}{3}$$

answer

$$5, \frac{7}{3}, -5$$

15a) Find the vertical asymptotes

$$h(x) = \frac{x+3}{x(x+4)}$$

$$\text{Let } x(x+4) = 0$$

$$x = 0$$

OR

$$x+4 = 0$$

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

$$x = -4$$

Vertical asymptotes

$$x = 0 \quad \text{OR} \quad x = -4$$

16) Find the horizontal asymptote

$$f(x) = \frac{18x^2}{9x^2 + 1}$$

$$\lim_{x \rightarrow \infty} \left(\frac{18x^2}{9x^2 + 1} \right) =$$

$$\lim_{x \rightarrow \infty} \left(\frac{18x^2}{9x^2 + 1} \right) \frac{\frac{1}{x^2}}{\frac{1}{x^2}} =$$

$$\lim_{x \rightarrow \infty} \frac{\frac{18x^2}{x^2}}{\frac{9x^2}{x^2} + \frac{1}{x^2}} =$$

$$\lim_{x \rightarrow \infty} \frac{18}{9 + \frac{1}{x^2}} =$$

$$\frac{18}{9 + 0} =$$

$$\frac{18}{9} =$$

$$2 =$$

Horizontal asymptote

$$y = 2$$

formula

$$\lim_{x \rightarrow \infty} \frac{1}{x^n} = 0$$

(17) expand

$$\ln \left(\frac{x^8 \sqrt{x^2+6}}{(x+6)^6} \right)$$

$$\ln (x^8 \sqrt{x^2+6}) - \ln (x+6)^6 =$$

$$\ln (x^8) + \ln \sqrt{x^2+6} - \ln (x+6)^6 =$$

$$\ln (x^8) + \ln (x^2+6)^{\frac{1}{2}} - \ln (x+6)^6 =$$

$$8 \ln (x) + \frac{1}{2} \ln (x^2+6) - 6 \ln (x+6) =$$

formulas

$$\ln \left(\frac{A}{B} \right) = \ln (A) - \ln (B)$$

$$\ln (AB) = \ln (A) + \ln (B)$$

$$\ln (A^n) = n \ln (A)$$

$$(18) \quad 16^{x+8} = 256^{x-6}$$

$$(4^2)^{x+8} = (4^4)^{x-6}$$

$$4^{2x+16} = 4^{4x-24}$$

mult Powers

$$2x+16 = 4x-24$$

$$2x+16-16 = 4x-24-16$$

$$2x = 4x - 40$$

$$2x - 4x = 4x - 40 - 4x$$

$$-2x = -40$$

$$\frac{-2x}{-2} = \frac{-40}{-2}$$

$$x = 20$$

$$(19) \log_3(x+23) + \log_3(x+5) = 5$$

$$\log_3(x+23)(x+5) = 5$$

$$3^5 = (x+23)(x+5)$$

$$243 = x^2 + 5x + 23x + 115$$

$$243 = x^2 + 28x + 115$$

$$0 = x^2 + 28x + 115 - 243$$

$$0 = x^2 + 28x - 128$$

$$0 = (x-4)(x+32)$$

set $x-4=0$ OR $x+32=0$

$x-4+4=0+4$ OR $x+32-32=0-32$

$x=4$ OR ~~$x=-32$~~

Check

$$\log_3(x+23) + \log_3(x+5) = 5$$

$$\log_3(4+23) + \log_3(4+5) = 5$$

$$\log_3(27) + \log_3(9) = 5$$

Good Good

$$\log_3(-32+23) + \log_3(-32+5) = 5$$

$$\log_3(-9) + \log_3(-27) = 5$$

BAD BAD

answer

$$x=4$$

only

formula

$$\log_3(A) + \log_3(B) = \log_3(AB)$$

$$\textcircled{20} \log_3 (x+23) - \log_3 (x-3) = 3$$

$$\log_3 \left(\frac{x+23}{x-3} \right) = 3$$

$$3^3 = \frac{x+23}{x-3}$$

$$\frac{27}{1} = \frac{x+23}{x-3}$$

$$27(x-3) = 1(x+23) \quad \text{cross mult}$$

$$27x - 81 = 1x + 23$$

$$27x - 81 + 81 = 1x + 23 + 81$$

$$27x = 1x + 104$$

$$27x - 1x = 1x + 104 - 1x$$

$$26x = 104$$

$$\frac{26x}{26} = \frac{104}{26}$$

$$\textcircled{x=4}$$

Check

$$\log_3 (x+23) - \log_3 (x-3) = 3$$

$$\log_3 (4+23) - \log_3 (4-3) = 3$$

$$\log_3 (27) - \log_3 (1) = 3$$

Good

answer Good

$$\boxed{x=4}$$

$$(2!) \quad A = Pe^{rt}$$

$$13000 = 6500 e^{.03t}$$

$$\frac{13000}{6500} = \frac{6500 e^{.03t}}{6500}$$

$$2 = e^{.03t}$$

$$\ln(2) = \ln(e^{.03t})$$

$$\ln(2) = .03t \ln(e)$$

$$\ln(2) = .03t (1)$$

$$\ln(2) = .03t$$

$$\frac{\ln(2)}{.03} = \frac{.03t}{.03}$$

$$23.10490602 = t$$

OR

$$23.1 = t$$

Round

$$A = 13000$$

$$P = 6500$$

$$r = 3\% = .03$$

$$t = ?$$

Use a graphing calculator

22

$$x + y + 2z = 9$$

$$x + y + 3z = 12$$

$$x - 5y - 2z = -9$$

Solve
System

2ND, Matrix, edit, [A], 3x4, enter

$$[A] = \begin{bmatrix} 1 & 1 & 2 & 9 \\ 1 & 1 & 3 & 12 \\ 1 & -5 & -2 & -9 \end{bmatrix}$$

2ND, Matrix, Math, ↓, rref()
2ND matrix

$$\text{rref}([A]) =$$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 3 \end{bmatrix} \begin{matrix} x \\ y \\ z \end{matrix}$$

$$(x, y, z) = (2, 1, 3)$$

23. write the first four terms in the sequence

$$a_n = \frac{2n}{n+1}$$

$$a_1 = \frac{2(1)}{1+1} = \frac{2}{2} = 1$$

$$a_2 = \frac{2(2)}{2+1} = \frac{4}{3}$$

$$a_3 = \frac{2(3)}{3+1} = \frac{6}{4} = \frac{\cancel{2}(3)}{\cancel{2}(2)} = \frac{3}{2}$$

$$a_4 = \frac{2(4)}{4+1} = \frac{8}{5}$$

24.

$$\sum_{k=1}^3 k(k+2)$$

$$1(1+2) + 2(2+2) + 3(3+2) =$$
$$1(3) + 2(4) + 3(5) =$$

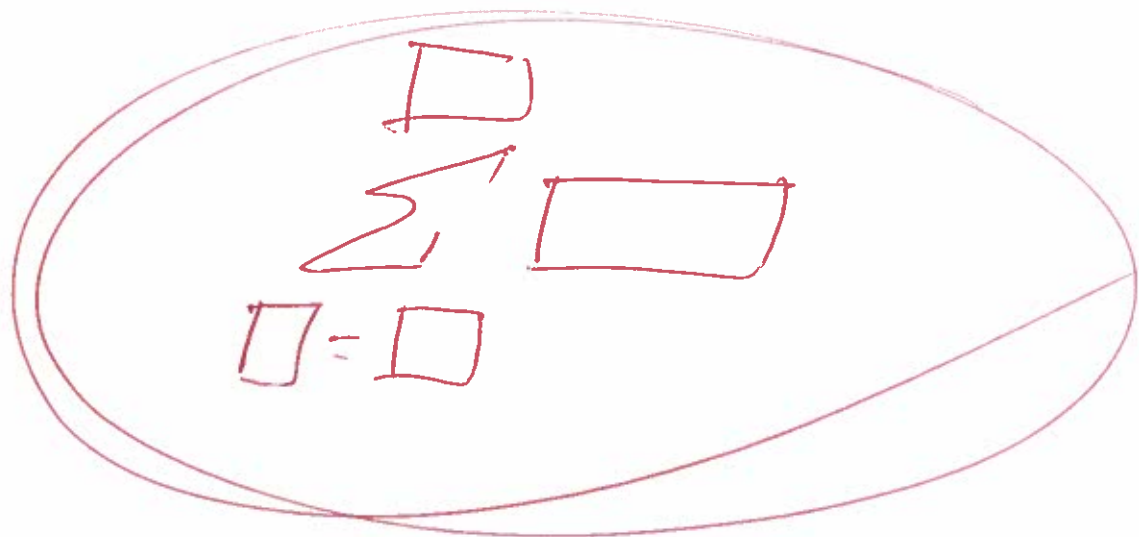
$$3 + 8 + 15 =$$

26.

OR

use graphing calculator

math, ↓, summation Σ ()



25

Use binomial theorem

$$(3x-2)^3$$
$${}^3C_0 (3x)^3 (-2)^0 + {}^3C_1 (3x)^2 (-2)^1 + {}^3C_2 (3x)^1 (-2)^2 + {}^3C_3 (3x)^0 (-2)^3 =$$

$$(1)(27x^3)(1) + (3)(9x^2)(-2) + (3)(3x)(4) + (1)(1)(-8) =$$

$$(1)(27x^3)(1) + (3)(9x^2)(-2) + (3)(3x)(4) + (1)(1)(-8) =$$

$$27x^3 - 54x^2 + 36x - 8 =$$

Use graphing calculator

$${}^3C_0 \text{ Math, Prb, nCr, } 0 = 1$$

$${}^3C_1 \text{ Math, Prb, nCr, } 1 = 3$$

$${}^3C_2 \text{ Math, Prb, nCr, } 2 = 3$$

$${}^3C_3 \text{ Math, Prb, nCr, } 3 = 1$$