① Solve
$x^2 - x - 56 = 0$

posib
56 · 1
28 · 2
14 · 4
7 · 8

M13M99 Pract Stop

[redacted]

11-04-17

1

$(x+7)(x-8) = 0$

let $x+7=0$ OR $x-8=0$

$x+7-7=0-7$ OR $x-8+8=0+8$

$\boxed{x=-7}$ OR $\boxed{x=8}$

Use Quadratic Formula

$1x^2 - 1x - 56 = 0$

$a=1,\ b=-1,\ c=-56$

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

$$x = \frac{-(-1) \pm \sqrt{(-1)^2-4(1)(-56)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{1+224}}{2}$$

$$x = \frac{1 \pm \sqrt{225}}{2}$$

$$x = \frac{1 \pm 15}{2}$$

$x = \frac{1+15}{2}$ OR $x = \frac{1-15}{2}$

$x = \frac{16}{2}$ OR $x = -\frac{14}{2}$

$\boxed{x = 8}$ OR $\boxed{x = -7}$

② Solve

possibly

$32 \cdot 1$

$16 \cdot 2$

$4 \cdot 8$

②

$x^2 = 4x + 32$

$x^2 - 4x - 32 = 0$ rewrite

$(x+4)(x-8) = 0$

so $x+4=0$ or $x-8=0$

$x+4-4=0-4$ or $x-8+8=0+8$

$\boxed{x=-4}$ or $\boxed{x=8}$

OR

Use Quadratic formula

$1x^2 - 4x - 32 = 0$

$a=1, \; b=-4, \; c=-32$

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-32)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 + 128}}{2}$$

$$x = \frac{4 \pm \sqrt{144}}{2}$$

$$x = \frac{4 \pm 12}{2}$$

$x = \frac{4+12}{2}$ or $x = \frac{4-12}{2}$

$x = \frac{16}{2}$ or $x = -\frac{8}{2}$

$\boxed{x=8}$ or $\boxed{x=-4}$

③ Solve

$4x^2 = 23x + 72$

$4x^2 - 23x - 72 = 0$

$(4x + 9)(x - 8) = 0$

set $4x + 9 = 0$ OR $x - 8 = 0$

$4x + \cancel{9} - \cancel{9} = 0 - 9$ OR $x - \cancel{8} + \cancel{8} = 0 + 8$

$4x = -9$ OR $\boxed{x = 8}$

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

$\boxed{x = -9/4}$ OR

Possibles

4·1
2·2

72·1
36·2
18·4
8·9

Ⓑ

Use Quadratic formula

$4x^2 - 23x - 72 = 0$

$a = 4,\ b = -23,\ c = -72$

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

$$x = \frac{-(-23) \pm \sqrt{(-23)^2 - 4(4)(-72)}}{2(4)}$$

$$x = \frac{23 \pm \sqrt{529 + 1152}}{8}$$

$$x = \frac{23 \pm \sqrt{1681}}{8}$$

$$x = \frac{23 \pm 41}{8}$$

$x = \frac{23 + 41}{8}$ OR $x = \frac{23 - 41}{8}$

$x = \frac{64}{8}$ or $x = \frac{-18}{8}$

$\boxed{x = 8}$ OR $x = \frac{\cancel{2}(-9)}{\cancel{2}(4)}$

OR $\boxed{x = -9/4}$

④ Solve

④

$$4x^2+12x=0$$

$$4x(x+3)=0$$

ZPA $4x=0$ OR $x+3=0$

$\frac{4x}{4}=\frac{0}{4}$ OR $x+3-3=0-3$

$\boxed{x=0}$ OR $\boxed{x=-3}$

OR

Use Quadratic Formula

$4x^2+12x+0=0$ rewrite

$a=4,\ b=12,\ c=0$

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

$$x=\frac{-(12)\pm\sqrt{(12)^2-4(4)(0)}}{2(4)}$$

$$x=\frac{-12\pm\sqrt{144-0}}{8}$$

$$x=\frac{-12\pm\sqrt{144}}{8}$$

$$x=\frac{-12\pm12}{8}$$

$x=\frac{-12+12}{8}$ OR $x=\frac{-12-12}{8}$

$x=\frac{0}{8}$ OR $x=\frac{-24}{8}$

$\boxed{x=0}$ OR $\boxed{x=-3}$

⑤ Solve by completing the square.

15

$x^2+2x=35$

$x^2+2x+(\frac{1}{2}(2))^2=35+(\frac{1}{2}(2))^2$

$x^2+2x+(1)^2=35+(1)^2$

$x^2+2x+1=35+1$

$x^2+2x+1=36$

$(x+1)(x+1)=36$

$(x+1)^2=36$

$\sqrt{(x+1)^2}=\pm\sqrt{36}$

$x+1=\pm 6$

$x+1=6$ OR $x+1=-6$

$x+\cancel{1}-\cancel{1}=6-1$ OR $x+\cancel{1}-\cancel{1}=-6-1$

$\boxed{x=5}$ or $\boxed{x=-7}$

Solve by ~~[illegible]~~ factoring

$x^2+2x=35$

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

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

Let $x-5=0$ OR $x+7=0$

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

$\boxed{x=5}$ OR $\boxed{x=-7}$

⑥ Solve by the Quadratic formula

⑥

$1x^2 + 8x + 12 = 0$

$a=1,\ b=8,\ c=12$

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

$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(1)(12)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{64 - 48}}{2}$

$x = \frac{-8 \pm \sqrt{16}}{2}$

$x = \frac{-8 \pm 4}{2}$

$x = \frac{-8-4}{2}$ or $x = \frac{-8+4}{2}$

$x = \frac{-12}{2}$ OR $x = \frac{-4}{2}$

$\boxed{x = -6}$ or $\boxed{x = -2}$

OR Solve by factoring

$x^2 + 8x + 12 = 0$

$(x+2)(x+6) = 0$

12·1
6·2
3·4

so $x+2=0$ OR $x+6=0$

$x+2-2=0-2$ OR $x+6-6=0-6$

$\boxed{x=-2}$ OR $\boxed{x=-6}$

⑦ Solve by the Quadratic Formula

⑦

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

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

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

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

$$x=\frac{7\pm\sqrt{49+16}}{4}$$

$$x=\frac{7\pm\sqrt{65}}{4}$$

$\boxed{x=\frac{7+\sqrt{65}}{4}}$ OR $\boxed{x=\frac{7-\sqrt{65}}{4}}$

(8.) Solve use Quadratic formula

8

$$1x^2 - 10x + 29 = 0$$

$$a = 1,\ b = -10,\ c = 29$$

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(29)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{100 - 116}}{2}$$

$$x = \frac{10 \pm \sqrt{-16}}{2}$$

$$x = \frac{10 \pm 4i}{2}$$

$x = 5 \pm 2i$ divide

$\boxed{x = 5 + 2i}$ OR $\boxed{x = 5 - 2i}$

⑨ Solve by the quadratic formula

$3x^2-11x=20$

$3x^2-11x-20=0$

$a=3,\ b=-11,\ c=-20$

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

$$x=\frac{-(-11)\pm\sqrt{(-11)^2-4(3)(-20)}}{2(3)}$$

$$x=\frac{11\pm\sqrt{121+240}}{6}$$

$$x=\frac{11\pm\sqrt{361}}{6}$$

$$x=\frac{11\pm19}{6}$$

$x=\frac{11+19}{6}$ or $x=\frac{11-19}{6}$

$x=\frac{30}{6}$ OR $x=\frac{-8}{6}$

$\boxed{x=5}$ or $x=\frac{\cancel{2}(-4)}{\cancel{2}(3)}$

$\boxed{x=-4/3}$

Solve by factors Possib $\boxed{3\cdot1}$ $20\cdot1$ $10\cdot2$ $\boxed{4\cdot5}$

$3x^2-11x-20=0$

$(3x+4)(x-5)=0$

so $3x+4=0$ or $x-5=0$

$3x+\cancel{4}-\cancel{4}=0-4$ OR $x-\cancel{5}+\cancel{5}=0+5$

$3x=-4$ or

$\frac{\cancel{3}x}{\cancel{3}}=\frac{-4}{3}$ $\boxed{x=-4/3}$ $\boxed{x=5}$

10. Solve by the Quadratic formula

10.

$3x^2+5=16x$

$3x^2+5-16x=16x-16x$

$3x^2-16x+5=0$

$a=3, \; b=-16, \; c=5$

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

$$x=\frac{-(-16)\pm\sqrt{(-16)^2-4(3)(5)}}{2(3)}$$

$$x=\frac{16\pm\sqrt{256-60}}{6}$$

$$x=\frac{16\pm\sqrt{196}}{6}$$

$$x=\frac{16\pm14}{6}$$

$x=\frac{16+14}{6}$ OR $x=\frac{16-14}{6}$

$x=\frac{30}{6}$ OR $x=\frac{2}{6}$

$x=\frac{\cancel{2}(1)}{\cancel{2}(3)}$

$x=5$ OR $x=1/3$

Solve by factoring possibly 3.1 5.1

$3x^2-16x+5=0$

$(3x-1)(x-5)=0$

let $3x-1=0$ OR $x-5=0$

$3x-1+1=0+1$ OR $x-5+5=0+5$

$3x=1$ OR $x=5$

$\frac{\cancel{3}x}{\cancel{3}}=\frac{1}{3}$ $x=1/3$

11.

Solve by the Quadratic formula

11

$x^2+4x=11$

$x^2+4x-11=11-11$

$1x^2+4x-11=0$

$a=1, \quad b=4, \quad c=-11$

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

$$x=\frac{-(4)\pm\sqrt{(4)^2-4(1)(-11)}}{2(1)}$$

$$x=\frac{-4\pm\sqrt{16+44}}{2}$$

$$x=\frac{-4\pm\sqrt{60}}{2}$$

$$x=\frac{-4\pm\sqrt{4*15}}{2}$$ rewrite

$$x=\frac{-4\pm\sqrt{4}\sqrt{15}}{2}$$

$$x=\frac{-4\pm2\sqrt{15}}{2}$$

$x=-2\pm1\sqrt{15}$

$x=-2\pm\sqrt{15}$

$\boxed{x=-2+\sqrt{15}}$ or $\boxed{x=-2-\sqrt{15}}$

Primes 2, 3, 5, 7, ...

$$\begin{array}{r|l} 2 & 60 \\ 2 & 30 \\ 3 & 15 \\ 5 & 5 \\ & 1 \end{array}$$

⑫ Solve by the Quadratic formula ⑫

$$y^2 - 8y + 17 = 0$$

$$1y^2 - 8y + 17 = 0$$

$$a = 1, \quad b = -8, \quad c = 17$$

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

$$y = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(17)}}{2(1)}$$

$$y = \frac{8 \pm \sqrt{64 - 68}}{2}$$

$$y = \frac{8 \pm \sqrt{-4}}{2}$$

$$y = \frac{8 \pm 2i}{2}$$

$y = 4 \pm 1i$ divide

$$y = 4 \pm i$$

$\boxed{y = 4 + i}$ or $\boxed{y = 4 - i}$

(13) Solve

13.

$\sqrt{2x+7} = x-4$

$(\sqrt{2x+7})^2 = (x-4)^2$

$2x+7 = (x-4)(x-4)$

$2x+7 = x^2-4x-4x+16$

$2x+7 = x^2-8x+16$

$0 = x^2-8x+16-2x-7$

$0 = x^2-10x+9$

$0 = (x-1)(x-9)$

set $x-1=0$ or $x-9=0$

$x-1+1=0+1$ OR $x-9+9=0+9$

$\cancel{x=1}$ BAD or $\boxed{x=9}$ ✓

~~CK~~

$\sqrt{2x+7} = x-4$

$\sqrt{2(1)+7} = (1)-4$

$\sqrt{2+7} = 1-4$

$\sqrt{9} = -3$

$3 \neq -3$

BAD

CK

$\sqrt{2x+7} = x-4$

$\sqrt{2(9)+7} = (9)-4$

$\sqrt{18+7} = 9-4$

$\sqrt{25} = 5$

$5 = 5$

Good

$\boxed{\{9\}}$

14. $f(x) = x^2 + 9x - 1$

14

$f(-8) = (-8)^2 + 9(-8) - 1$

$f(-8) = (-8)(-8) + 9(-8) - 1$

$f(-8) = 64 - 72 - 1$

$f(-8) = -8 - 1$

$\boxed{f(-8) = -9}$ ✓

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

$f(x+9) = (x+9)(x+9) + 9(x+9) - 1$

$f(x+9) = x^2 + 9x + 9x + 81 + 9x + 81 - 1$

$\boxed{f(x+9) = x^2 + 27x + 161}$ ✓

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

$f(-x) = (-x)(-x) + 9(-x) - 1$

$\boxed{f(-x) = x^2 - 9x - 1}$ ✓

15. graph $f(x)=|x|$ and $g(x)=|x|-8$

$f(x)=|x|$

$f(-1)=|-1|$

$f(-1)=1$

$f(0)=|0|$

$f(0)=0$

$f(1)=|1|$

$f(1)=1$

X	f(x)
-1	1
0	0
1	1

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

$g(-1)=|-1|-8$

$g(-1)=1-8$

$g(-1)=-7$

$g(0)=|0|-8$

$g(0)=0-8$

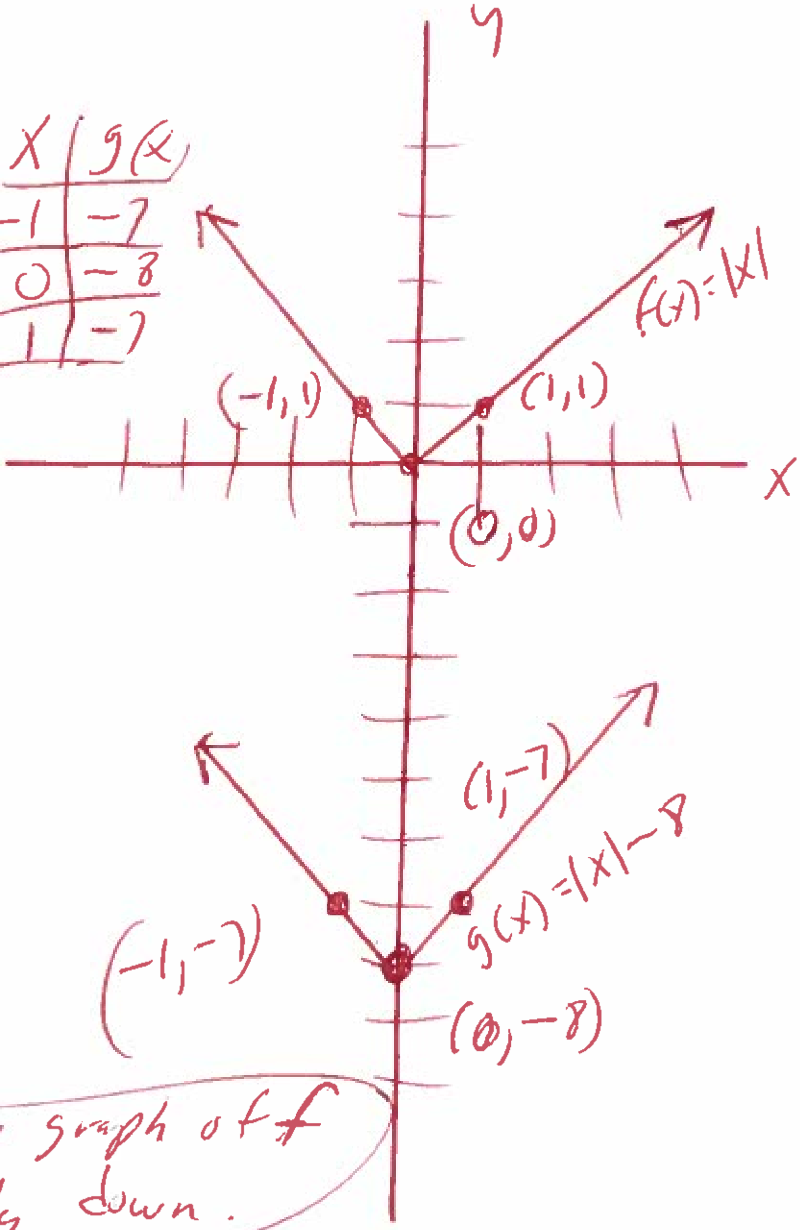
$g(0)=-8$

$g(1)=|1|-8$

$g(1)=1-8$

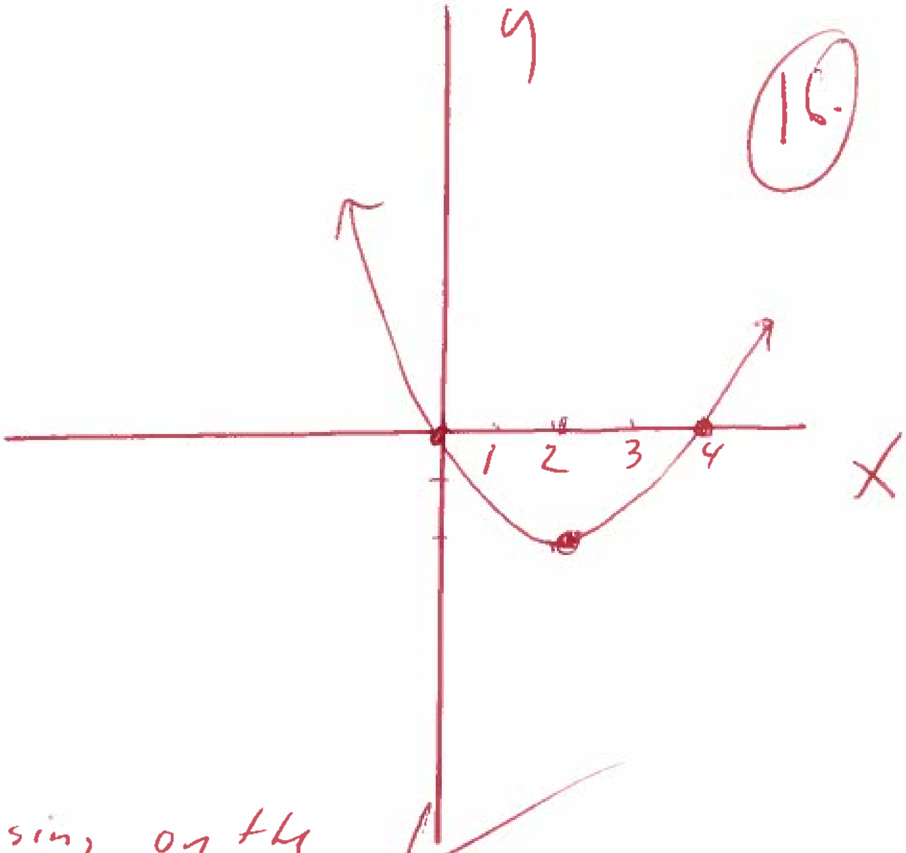
$g(1)=-7$

X	g(x)
-1	-7
0	-8
1	-7



The graph of g is the graph of f shifted 8 units vertically down.

16.



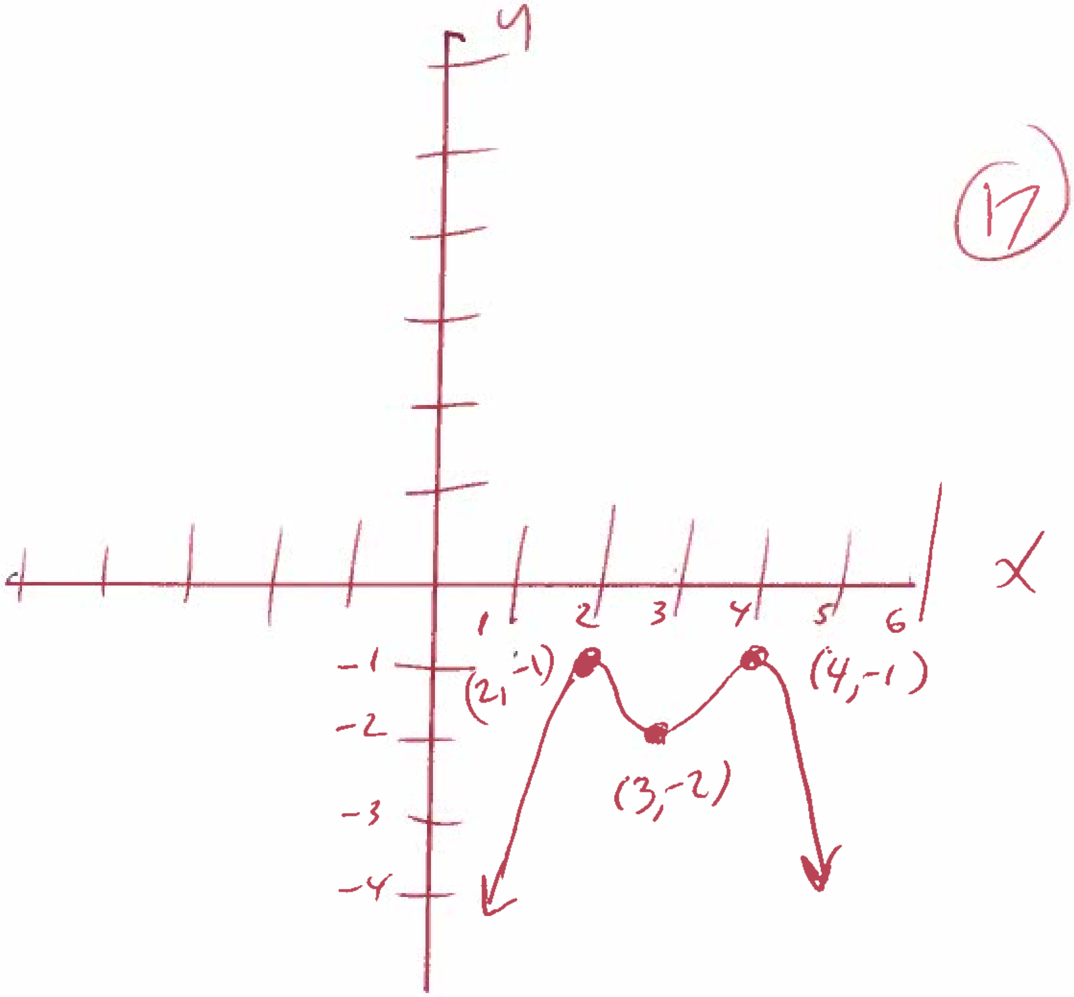
The function is increasing on the interval (2, ∞) ✓

The function is decreasing on the interval (−∞, 2) ✓

There is no interval on which the function is constant. ✓

17

17



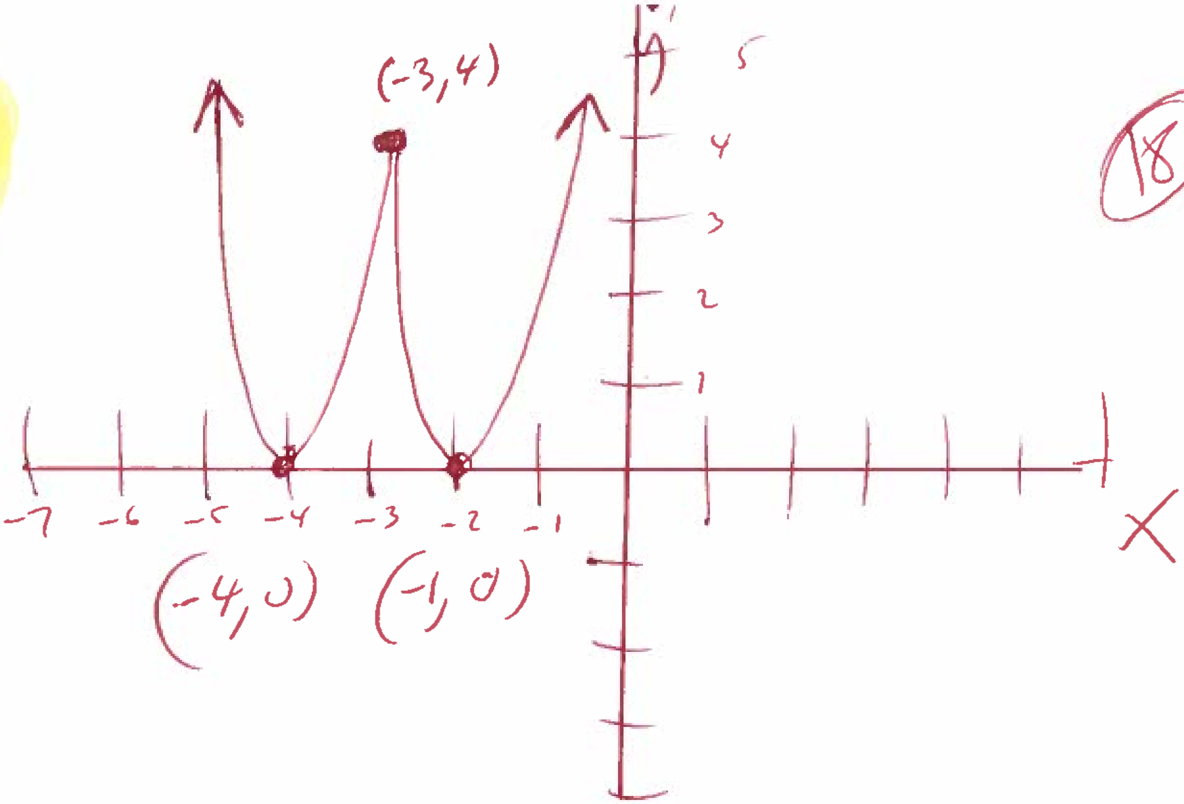
✓ The function is increasing on the intervals $(-\infty, 2)$ and $(3, 4)$.

✓ The function is decreasing on the intervals $(2, 3)$ and $(4, \infty)$.

✓ The function is never constant.

18.

18



✓ The number at which f has a relative maximum is $\boxed{x=-3}$.

✓ The relative maximum is $\boxed{4.}$

✓ The numbers at which f has a relative minimum are $x=-4$ and $x=-2$.

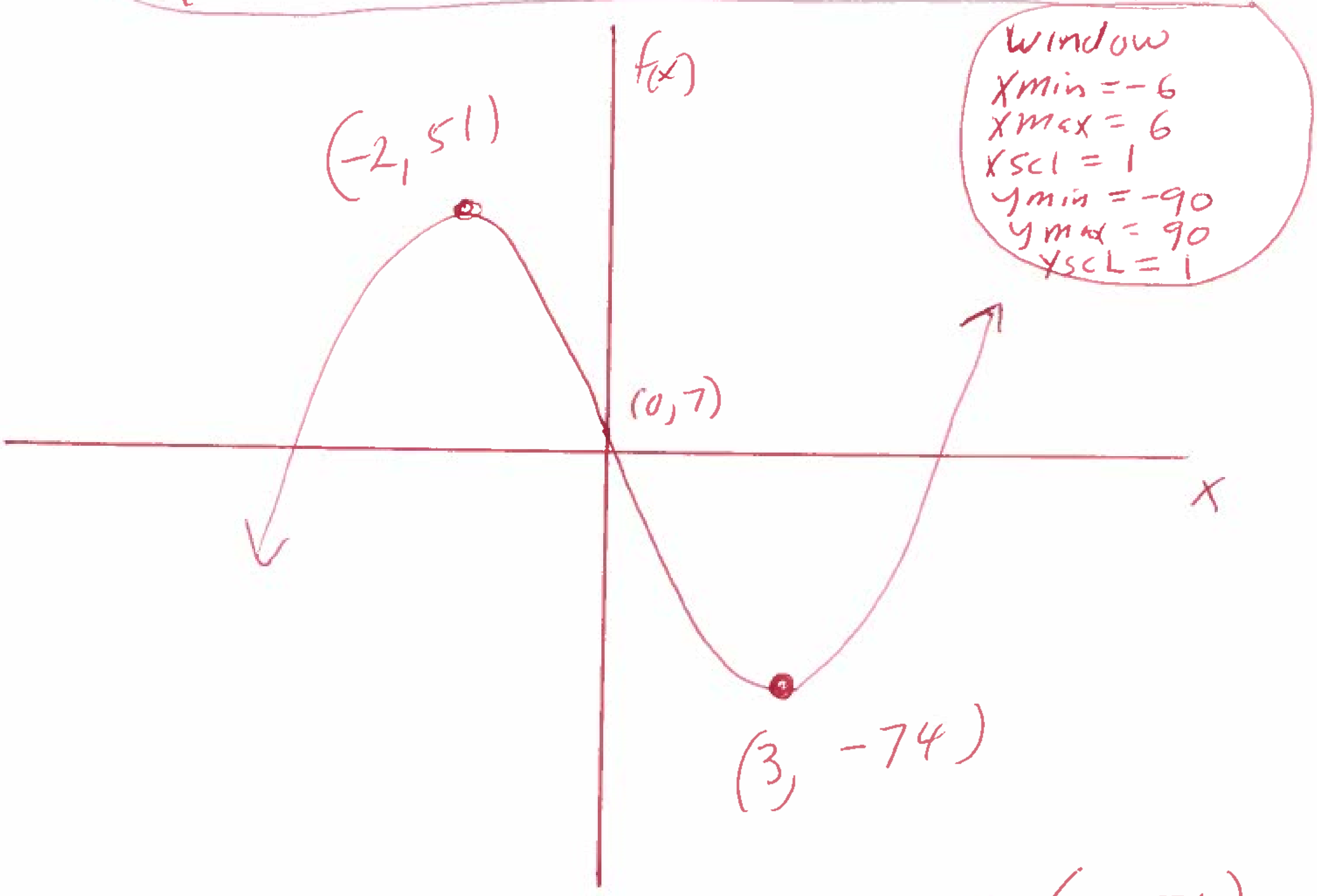
✓ The relative minumums are 0 and 0.

(19.) Find max and min

$f(x) = 2x^3 - 3x^2 - 36x + 7$

use graphing calculator

$Y_1 = 2X\wedge3 - 3X\wedge2 - 36X + 7$



Window
Xmin = -6
Xmax = 6
Xscl = 1
Ymin = -90
Ymax = 90
XscL = 1

The function has a relative max at (-2, 51).

The function has a relative min at (3, -74).

20 graph

20.

$$f(x) = \begin{cases} -2x & \text{if } x \le 0 \\ -4 & \text{if } x > 0 \end{cases}$$

use graphing calculator

2ND math

$Y_1 = -2X \div (X \le 0)$ Close

2ND math

$Y_2 = -4 \div (X > 0)$ OPEN

window

Xmin = -12

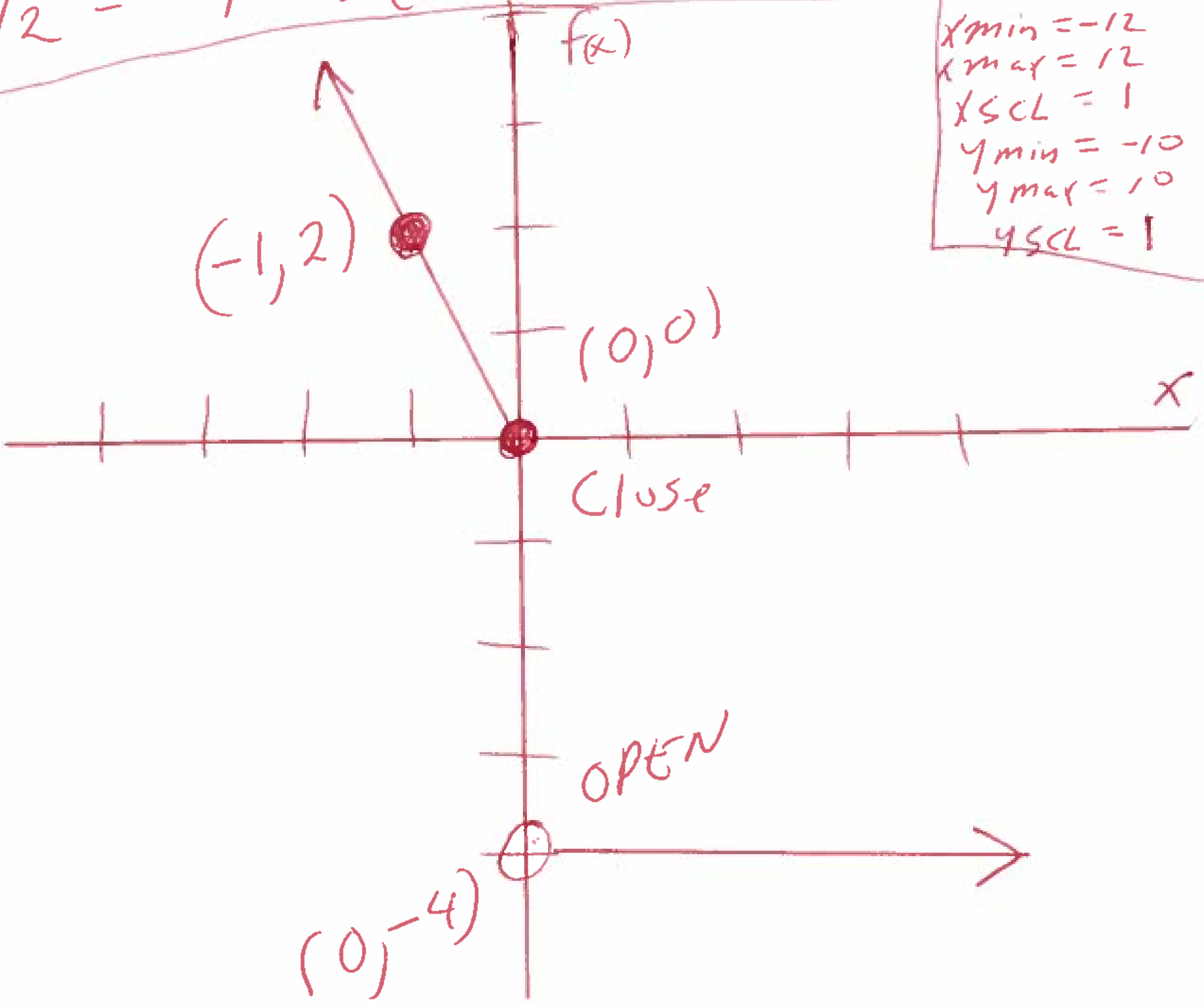
Xmax = 12

XSCL = 1

Ymin = -10

Ymax = 10

YSCL = 1



21.

21. graph

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

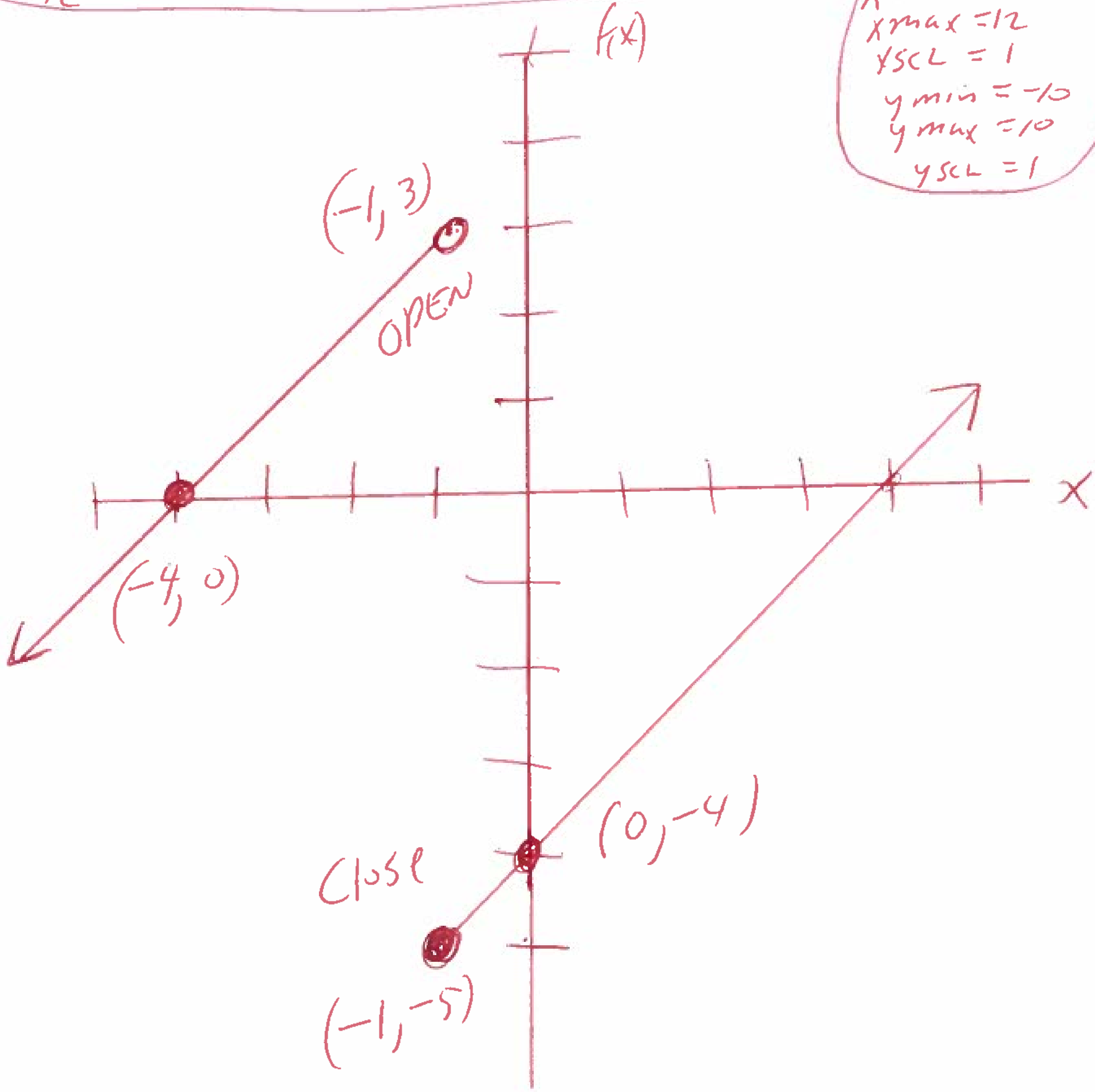
use graphin calculator 2ND math

$y_1 = x+4 \div (x < -1)$ OPEN

2ND math

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

window
Xmin = -12
Xmax = 12
XSCL = 1
ymin = -10
ymax = 10
yscl = 1



22. graph

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

use graphing calculator 2ND math

$y_1 = X+2 \div (X<3)$ OPEN

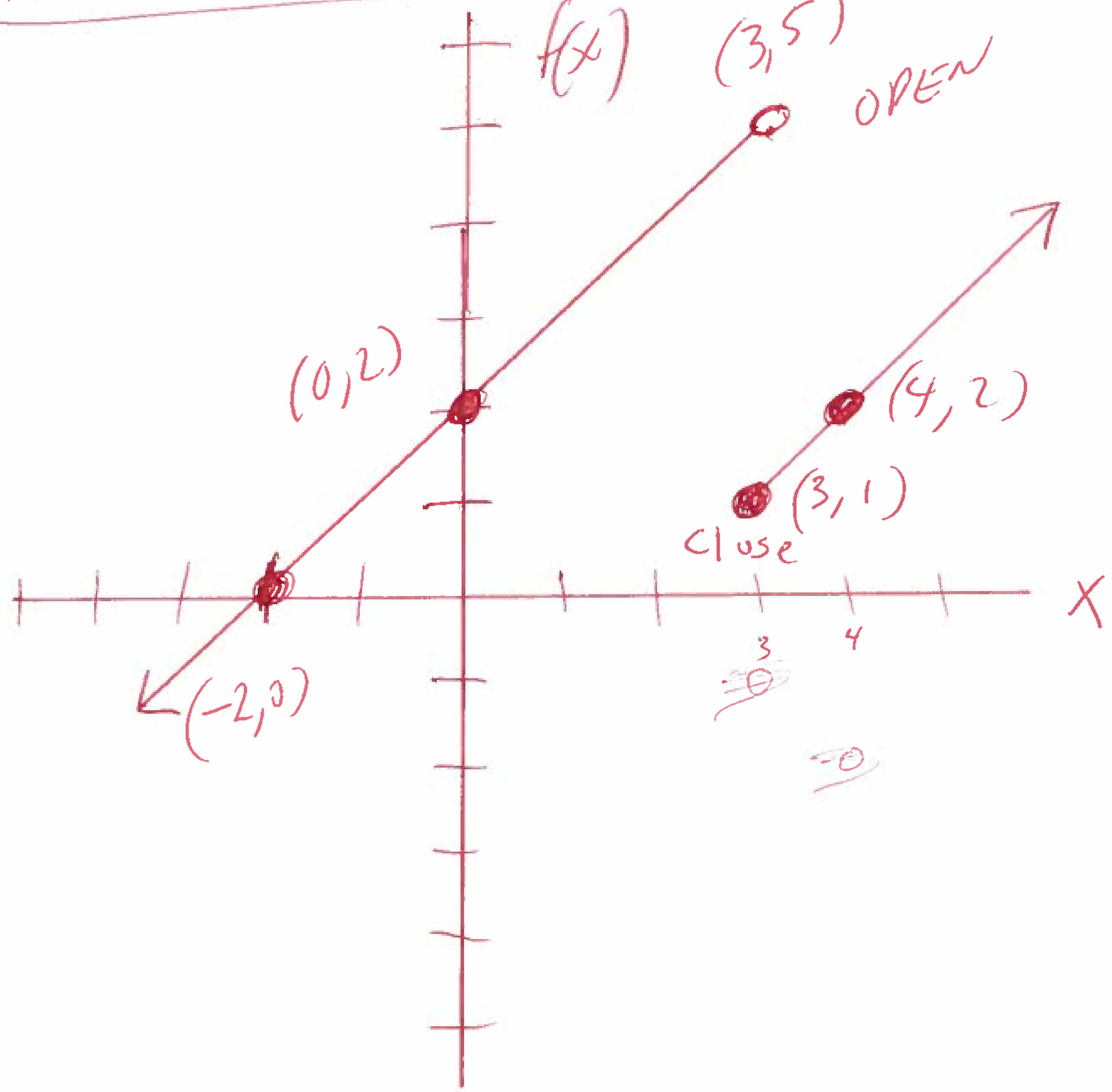
2ND math

$y_2 = X-2 \div (X \geq 3)$ Close

22.

window

Xmin = -12
Xmax = 12
Xscl = 1
ymin = -10
ymax = 10
yscl = 1



㉓ $f(x)=x^2-2x+2$

㉓

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

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

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

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

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

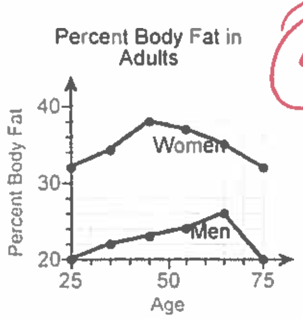
$$\frac{2xh+h^2-2h}{h} =$$

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

$$\boxed{2x+h-2} =$$

24.

24. With aging, body fat increases and muscle mass declines. The graph to the right shows the percent body fat in a group of adult women and men as they age from 25 to 75 years. Age is represented along the x-axis, and percent body fat is represented along the y-axis. State the intervals on which the graph giving the percent body fat in women is increasing and decreasing.



On what interval is the graph increasing?

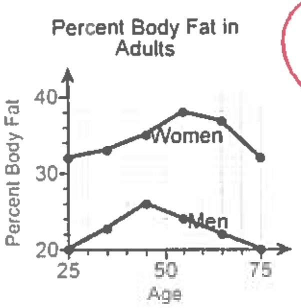
○ A. (45,75)
○ B. (20,26)
○ C. (25,75)
☑ D. (25,45)

On what interval is the graph decreasing?

☑ A. (45,75)
○ B. (25,45)
○ C. (25,75)
○ D. (20,38)

25.

25. With aging, body fat increases and muscle mass declines. The graph to the right shows the percent body fat in a group of adult women and men as they age from 25 to 75 years. Age is represented along the x-axis, and percent body fat is represented along the y-axis. For what age does the percent body fat in men reach a maximum? What is the percent body fat for that age?



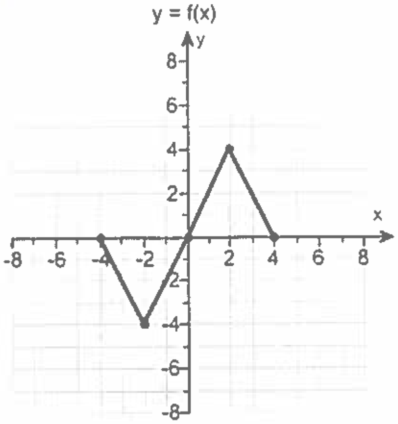
The percent body fat in men reaches a maximum at the age of 45 years.

What is the percent body fat at the maximum?

26 %

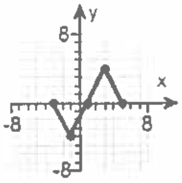
26

26. Use the graph of y = f(x) to graph the function g(x) = f(x) − 1.

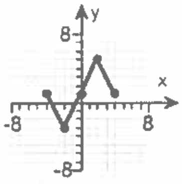


Choose the correct graph of g below.

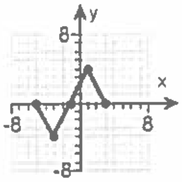
○ A.



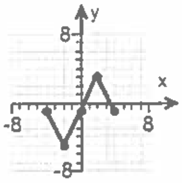
○ B.



○ C.

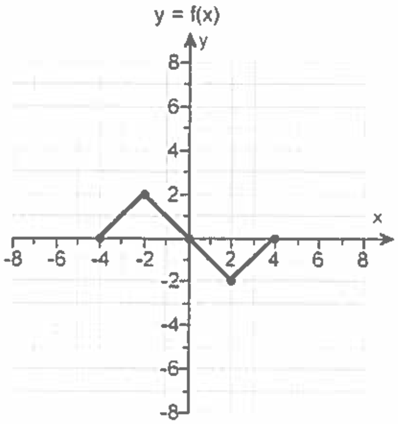


[✓ D.]



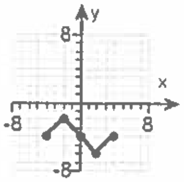
27)

27. Use the graph of $y = f(x)$ to graph the function $g(x) = f(x + 4)$.

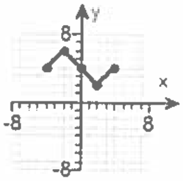


Choose the correct graph of g below.

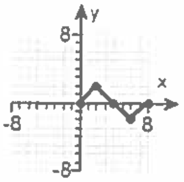
○ **A.**



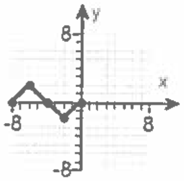
○ **B.**



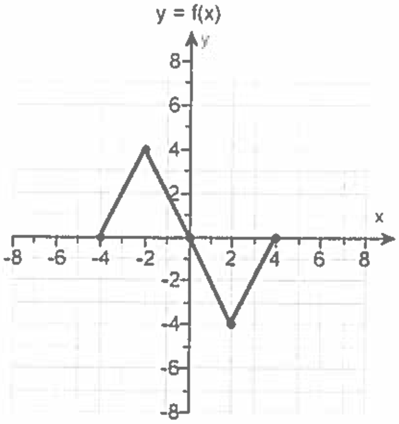
○ **C.**



✓ **D.**



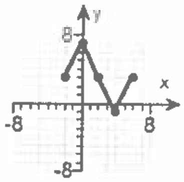
28. Use the graph of y = f(x) to graph the function g(x) = f(x + 2) + 3.



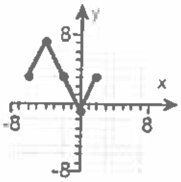
Choose the correct graph of g below.

28!

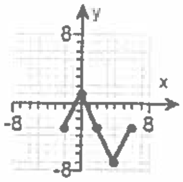
○ A.



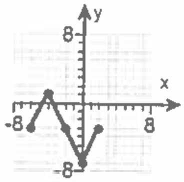
[✓ B.]



○ C.

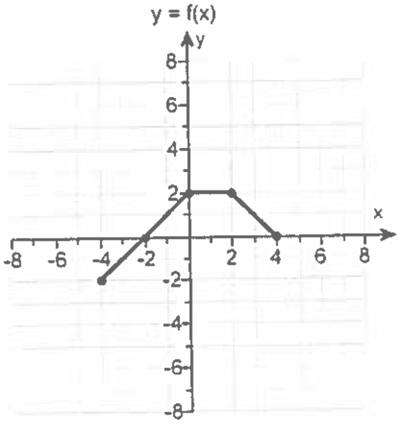


○ D.



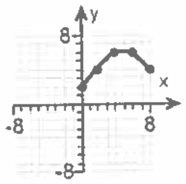
29

29. Use the graph of y = f(x) to graph the function $g(x) = f(x + 4) + 4$.

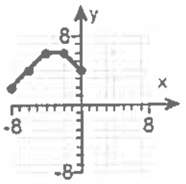


Choose the correct graph of g below.

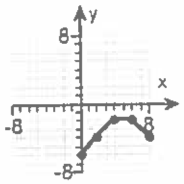
○ A.



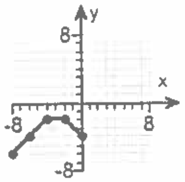
[✓ B.]



○ C.



○ D.



30 graph

$g(x) = (x+2)^2$

x	g(x)
−3	1
−2	0
−1	1

39

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

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

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

$g(-3) = 1$

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

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

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

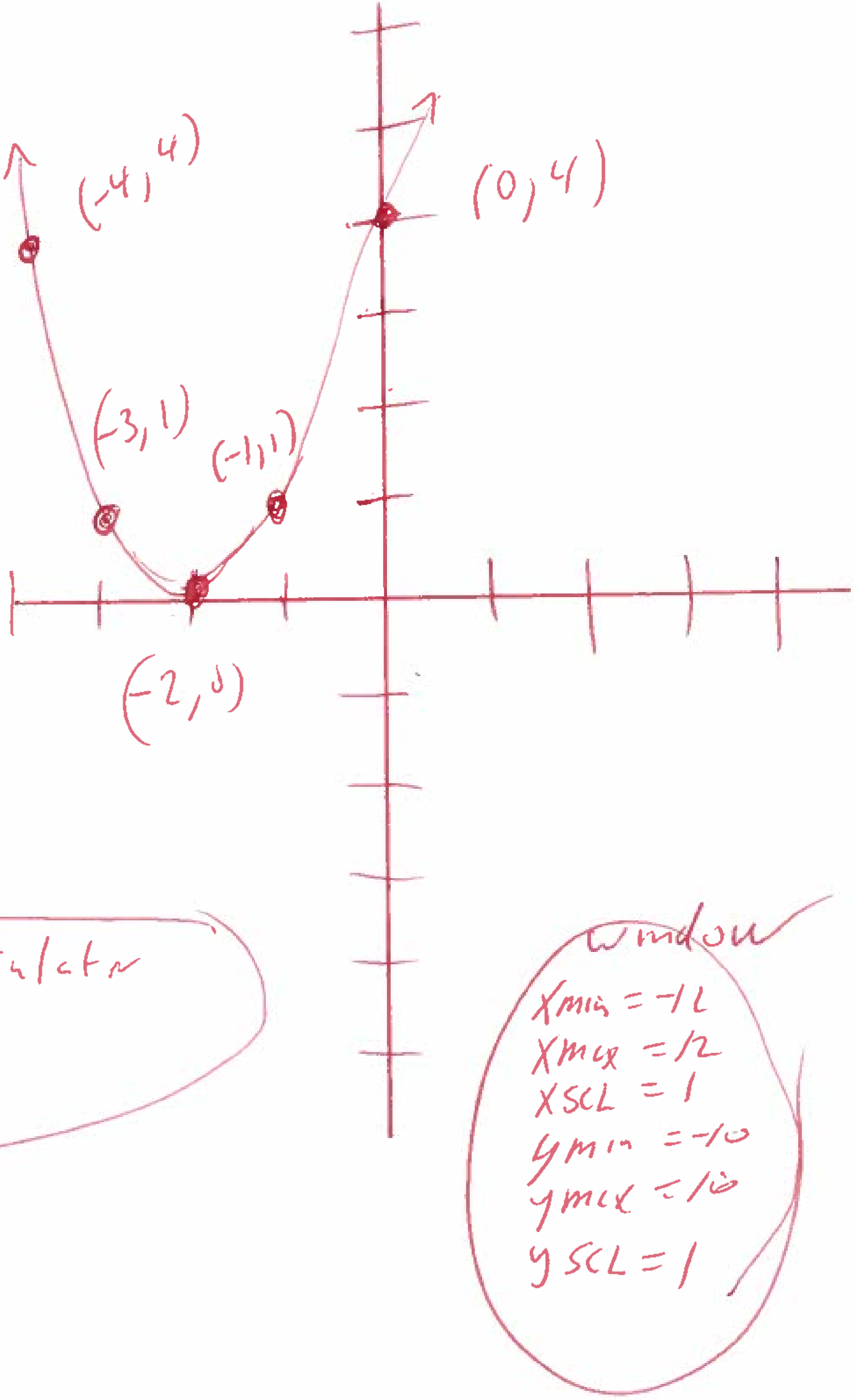
$g(-2) = 0$

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

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

$g(-1) = (1)(1)$

$g(-1) = 1$



Use graphing Calculator

$Y_1 = (X+2)^2$

Window

Xmin = −12
Xmax = 12
XSCL = 1
Ymin = −10
Ymax = 10
YSCL = 1

31. Find the domain

$g(x) = \sqrt{2x-16}$

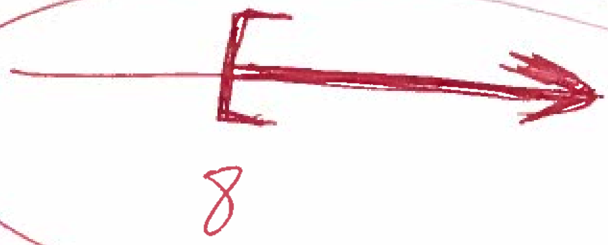
set $2x-16 \geq 0$

$2x \cancel{-16} + \cancel{16} \geq 0 + 16$

$2x \geq 16$

$\frac{\cancel{2}x}{\cancel{2}} \geq \frac{16}{2}$

$x \geq 8$



$[8, +\infty)$

Formula

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

set $Ax+B \geq 0$

31

32. Find the domain

32

$f(x) = \sqrt{4-2x}$

let $4-2x \geq 0$

$\cancel{4}-2x\cancel{-4} \geq 0-4$

$-2x \geq -4$

$\frac{-\cancel{2}x}{-\cancel{2}} \leq \frac{-4}{-2}$

Turn the alligator
Since you divide by -2

$x \leq 2$

$(-\infty, 2]$

(33) $f(x) = 6x + 2$ and $g(x) = x - 9$

(33)

$(f+g)(x) =$

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

$(6x+2) + (x-9) =$

$6x + 2 + x - 9 =$

$7x - 7 =$

Doman $(-\infty, \infty)$

$(f-g)(x) =$

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

$(6x+2) - (x-9) =$

$6x + 2 - x + 9 =$

$5x + 11 =$

Doman $(-\infty, \infty)$

$(fg)(x) =$

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

$(6x+2)(x-9) =$

$6x^2 - 54x + 2x - 18 =$

$6x^2 - 52x - 18 =$

Doman $(-\infty, \infty)$

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

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

$\frac{6x+2}{x-9} =$

un $x - 9 = 0$

$x - \cancel{9} + \cancel{9} = 0 + 9$

$x \neq 9$

Doman $\{x \mid x \neq 9\}$

Doman $(-\infty, 9) \cup (9, \infty)$

㉞ $f(x)=4x^2-31x+42$ and $g(x)=x-6$ ㉞

$(f+g)(x)=$

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

$(4x^2-31x+42)+(x-6)=$

$4x^2-31x+42+x-6=$

$\boxed{4x^2-30x+36=}$ $\boxed{\text{domain } (-\infty,\infty)}$

$(f-g)(x)=$

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

$(4x^2-31x+42)-(x-6)=$

$4x^2-31x+42-x+6=$

$\boxed{4x^2-32x+48=}$ $\boxed{\text{domain } (-\infty,\infty)}$

$(fg)(x)=$

$f(x)g(x)=$

$(4x^2-31x+42)(x-6)=$

$4x^3-24x^2-31x^2+186x+42x-252=$

$\boxed{4x^3-55x^2+228x-252=}$ $\boxed{\text{domain } (-\infty,\infty)}$

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

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

$\frac{4x^2-31x+42}{x-6}=$ → $\frac{(4x-7)\cancel{(x-6)}}{\cancel{(x-6)}}=$ factor

set $x-6=0$

$x-6+6=0+6$

$x=6$

$\boxed{4x-7=}$

$\boxed{\text{domain } \{x|x\neq 6\}}$

$\boxed{(-\infty,6)\cup(6,\infty)}$

35: $f(x) = 3x$ and $g(x) = x+1$

35

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

$f(g(x)) =$

$f(x+1) =$

$3(x+1) =$

$\boxed{3x+3 =}$

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

$g(f(x)) =$

$g(3x) =$

$(3x)+1 =$

$\boxed{3x+1 =}$

$(f \circ g)(x) = 3x+3$

$(f \circ g)(3) = 3(3)+3$

$(f \circ g)(3) = 9+3$

$\boxed{(f \circ g)(3) = 12}$

$(g \circ f)(x) = 3x+1$

$(g \circ f)(3) = 3(3)+1$

$(g \circ f)(3) = 9+1$

$\boxed{(g \circ f)(3) = 10}$

36 $f(x) = 4x-5$ and $g(x) = 5x^2-5$ 36

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

$f(g(x)) =$

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

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

$20x^2 - 20 - 5 =$ ✓

$\boxed{20x^2 - 25 =}$

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

$g(f(x)) =$

$g(4x-5) =$

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

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

$5(16x^2 - 20x - 20x + 25) - 5 =$

$5(16x^2 - 40x + 25) - 5 =$

$80x^2 - 200x + 125 - 5 =$ ✓

$\boxed{80x^2 - 200x + 120 =}$

$(f \circ g)(x) = 20x^2 - 25$

$(f \circ g)(0) = 20(0)^2 - 25$

$(f \circ g)(0) = 20(0)(0) - 25$

$(f \circ g)(0) = 0 - 25$

$\boxed{(f \circ g)(0) = -25}$

$(g \circ f)(x) = 80x^2 - 200x + 120$

$(g \circ f)(0) = 80(0)^2 - 200(0) + 120$

$(g \circ f)(0) = 80(0)(0) - 200(0) + 120$

$(g \circ f)(0) = 0 - 0 + 120$

$\boxed{(g \circ f)(0) = 120}$

37. $f(x) = 1 - x$ and $g(x) = 2x^2 + x + 3$

37.

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

$f(g\,x) =$

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

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

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

$\boxed{-2x^2 - x - 2 =}$ ✓

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

$g(f(x)) =$

$g(1 - x) =$

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

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

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

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

$2 - 4x + 2x^2 + 1 - x + 3 =$

$\boxed{2x^2 - 5x + 6 =}$

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

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

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

$(f \circ g)(2) = -8 - 2 - 2$

$\boxed{(f \circ g)(2) = -12}$

$(g \circ f)(x) = 2x^2 - 5x + 6$

$(g \circ f)(2) = 2(2)^2 - 5(2) + 6$

$(g \circ f)(2) = 2(2)(2) - 5(2) + 6$

$(g \circ f)(2) = 8 - 10 + 6$

$(g \circ f)(2) = -2 + 6$

$\boxed{(g \circ f)(2) = 4}$

38 Find the distance between the pair of points (10,1) and (18,7)

x_1 y_1 x_2 y_2

38

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

$$d=\sqrt{((10)-(18))^2+((1)-(7))^2}$$

$$d=\sqrt{(10-18)^2+(1-7)^2}$$

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

$$d=\sqrt{64+36}$$

$$d=\sqrt{100}$$

$$\boxed{d=10}$$

39. find the midpoint of the line segment

39

$(10, 2)$ and $(8, 6)$

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

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

$$\text{Midpoint} = \left(\frac{(10) + (8)}{2}, \frac{(2) + (6)}{2}\right)$$

$$\text{Midpoint} = \left(\frac{10+8}{2}, \frac{2+6}{2}\right)$$

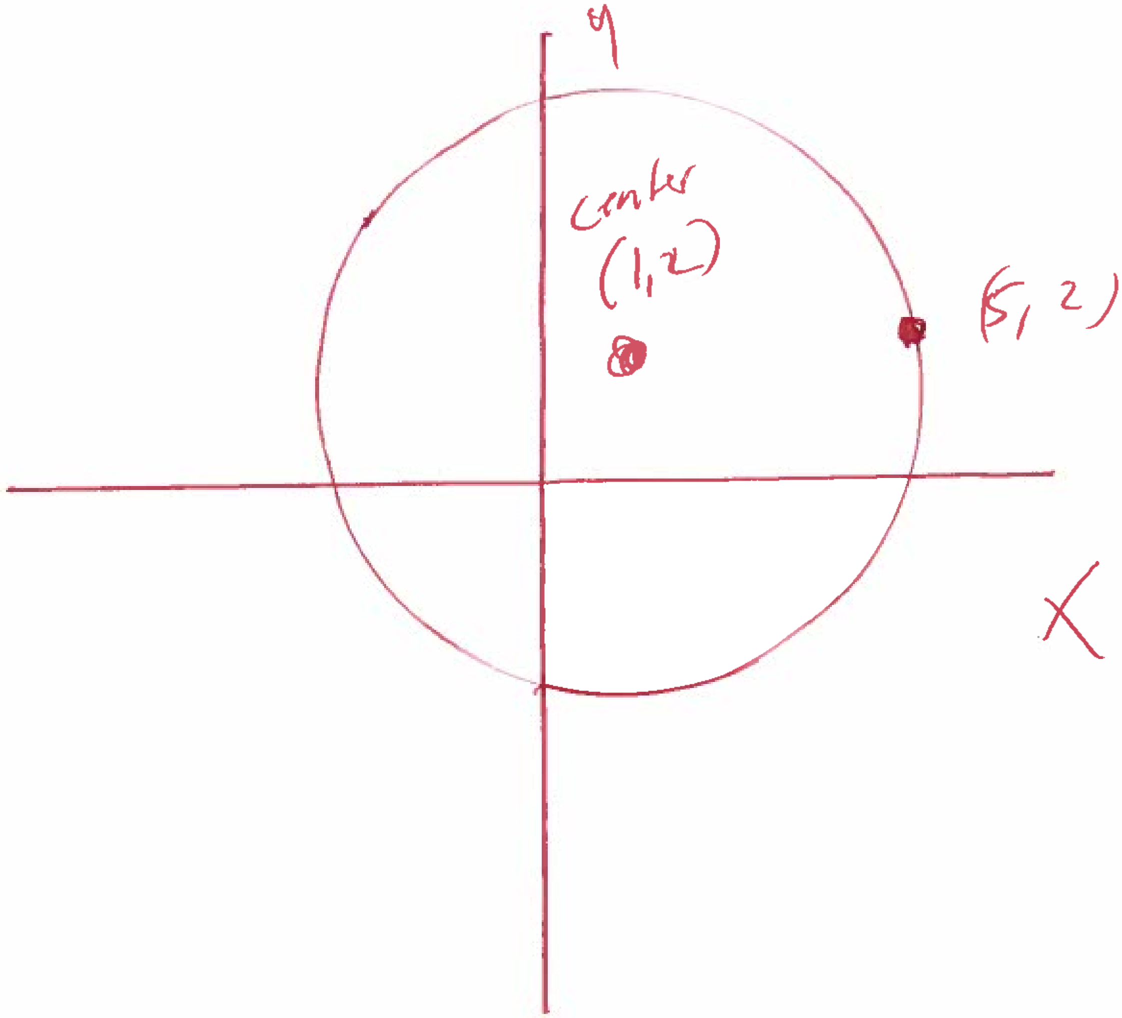
$$\text{Midpoint} = \left(\frac{18}{2}, \frac{8}{2}\right)$$

$$\text{Midpoint} = (9, 4)$$

(40.) graph

$(x-1)^2+(y-2)^2=16$

$\text{Center} = (\overset{\text{opp}}{1}, \overset{\text{opp}}{2})$ Radius $= \sqrt{16} = 4$



41. Graph

41.

$x^2+y^2+8x+6y+21=0$

$x^2+8x+y^2+6y=-21$

$x^2+8x+(\frac{1}{2}(8))^2+y^2+6y+(\frac{1}{2}(6))^2=-21+(\frac{1}{2}(8))^2+(\frac{1}{2}(6))^2$

$x^2+8x+(4)^2+y^2+6y+(3)^2=-21+(4)^2+(3)^2$

$x^2+8x+16+y^2+6y+9=-21+16+9$

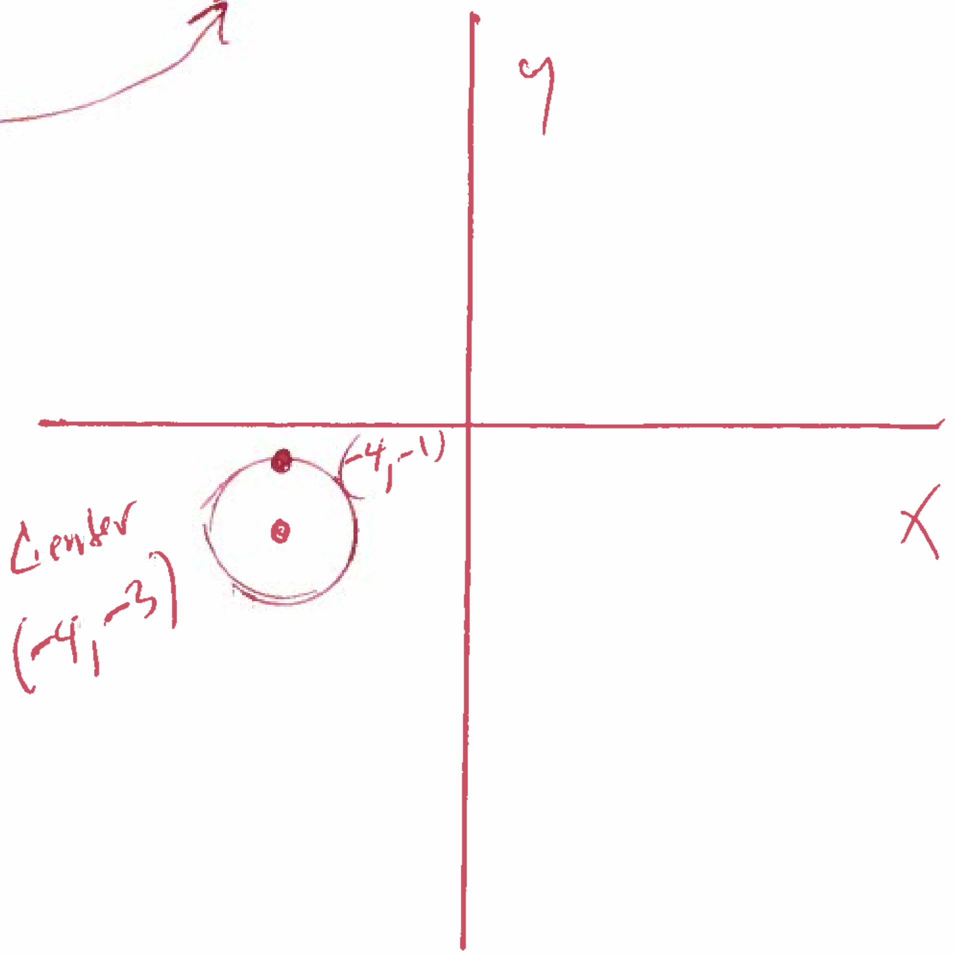
$(x+4)(x+4)+(y+3)(y+3)=4$

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

opp opp

CENTER $=(-4,-3)$

Radius $=\sqrt{4}=2$



42 graph

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

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

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

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

$f(0)=1+1$

$f(0)=2$

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

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

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

$f(1)=0+1$

$f(1)=1$

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

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

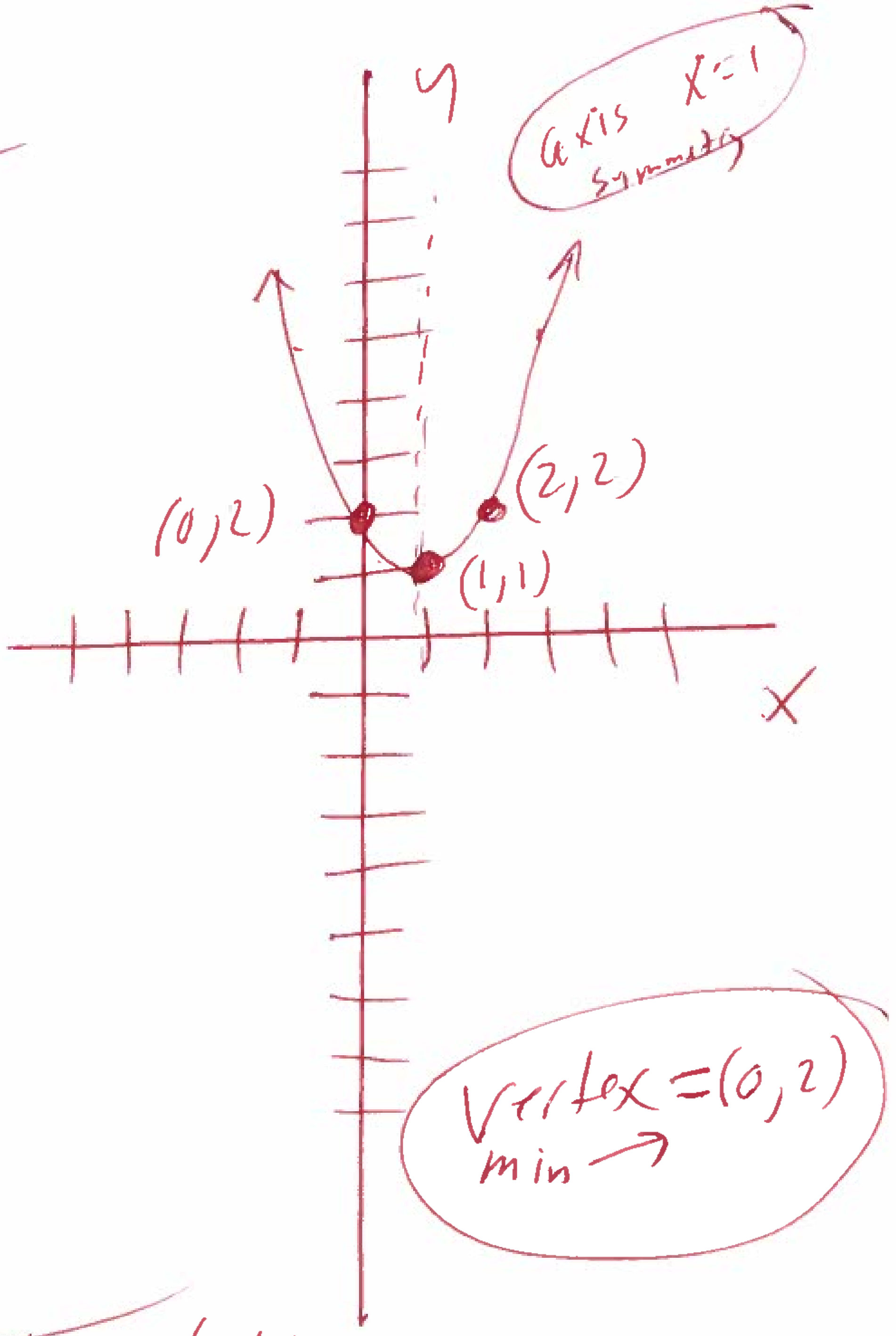
$f(2)=(1)(1)+1$

$f(2)=1+1$

$f(2)=2$

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

42



axis $x=1$ symmetry

Vertex $=(0,2)$
min →

OR use a graphing Calculator $y_1=(x-1)^2+1$

43. Find the vertex

43

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

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

$a = -1, \; b = -4, \; c = 4$

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

$\text{Vertex} = \left(\frac{-(-4)}{2(-1)}, \; f\left(\frac{-(-4)}{2(-1)}\right)\right)$

$\text{Vertex} \left(\frac{4}{-2}, \; f\left(\frac{4}{-2}\right)\right)$

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

$\text{Vertex} = (-2, \; -(-2)^2 - 4(-2) + 4)$

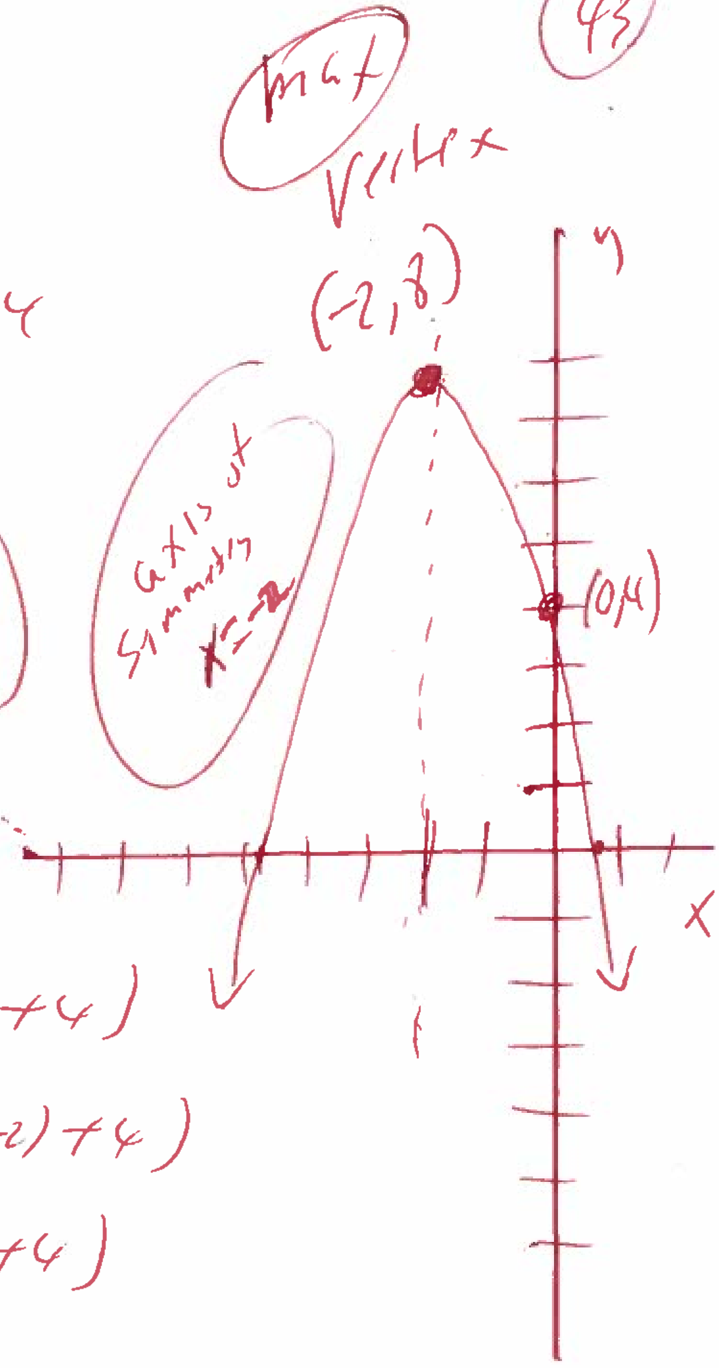
$\text{Vertex} = (-2, \; -(-2)(-2) - 4(-2) + 4)$

$\text{Vertex} = (-2, \; -(4) - 4(-2) + 4)$

$\text{Vertex} = (-2, \; -4 + 8 + 4)$

$\text{Vertex} = (-2, \; 4 + 4)$

$\text{Vertex} = (-2, 8)$



OR use a graphing calculator BIG

Lit

$y_1 = -x^2 - 4x + 4$

(44.) graph

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

use graphing calculator

(44)

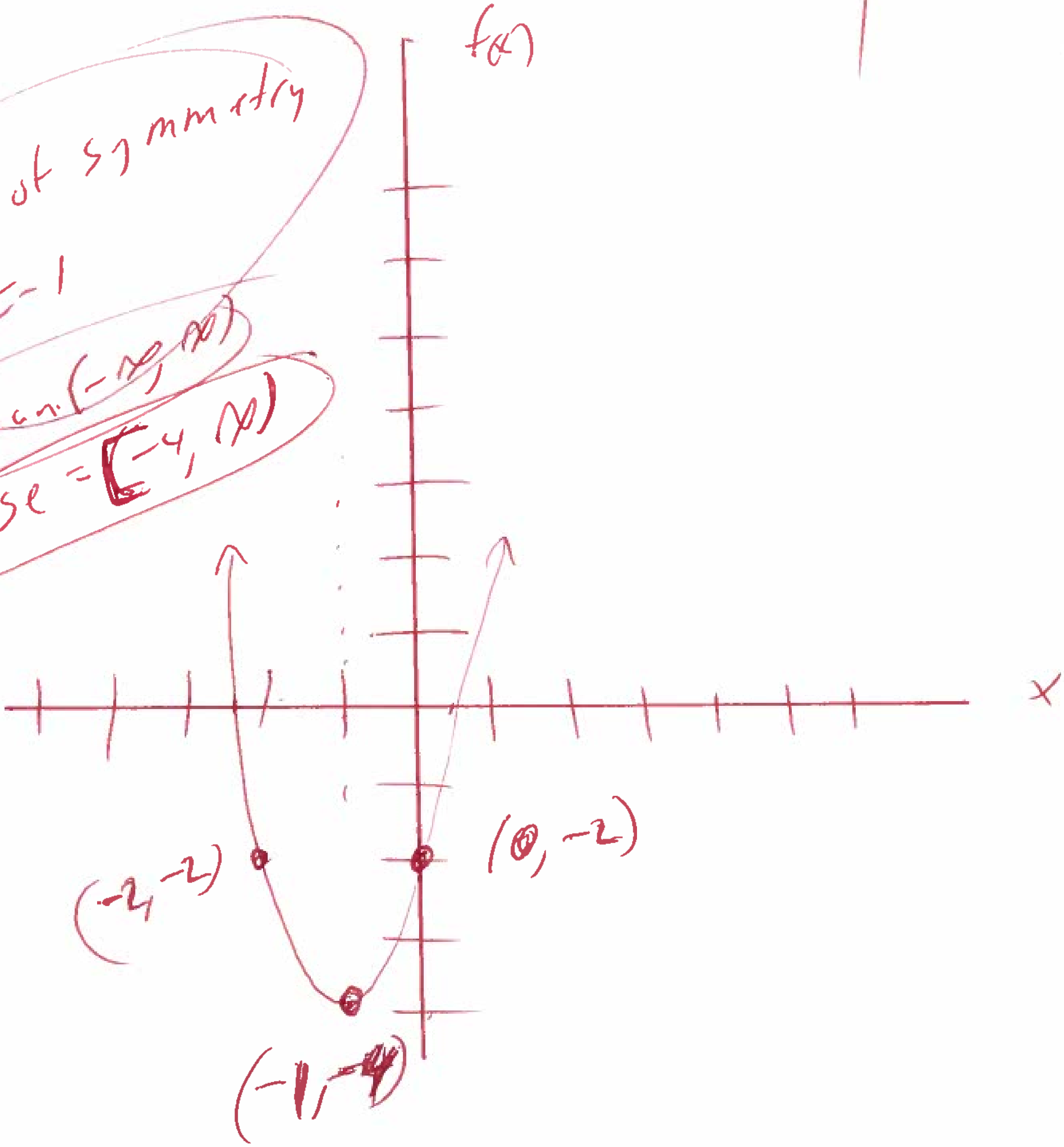
x	f(x)
-2	-2
-1	-4
0	-2

axis of symmetry

$x = -1$

domain $(-\infty, \infty)$

range $= [-4, \infty)$



(45) graph

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

find x-intercept let y = 0

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

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

$0 = (x - 1)(x + 3)$

$x - 1 = 0$ OR $x + 3 = 0$

$x - 1 + 1 = 0 + 1$ OR $x + 3 - 3 = 0 - 3$

$x = 1$ OR $x = -3$

$(1, 0)$ $(-3, 0)$

find y-intercept let x = 0

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

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

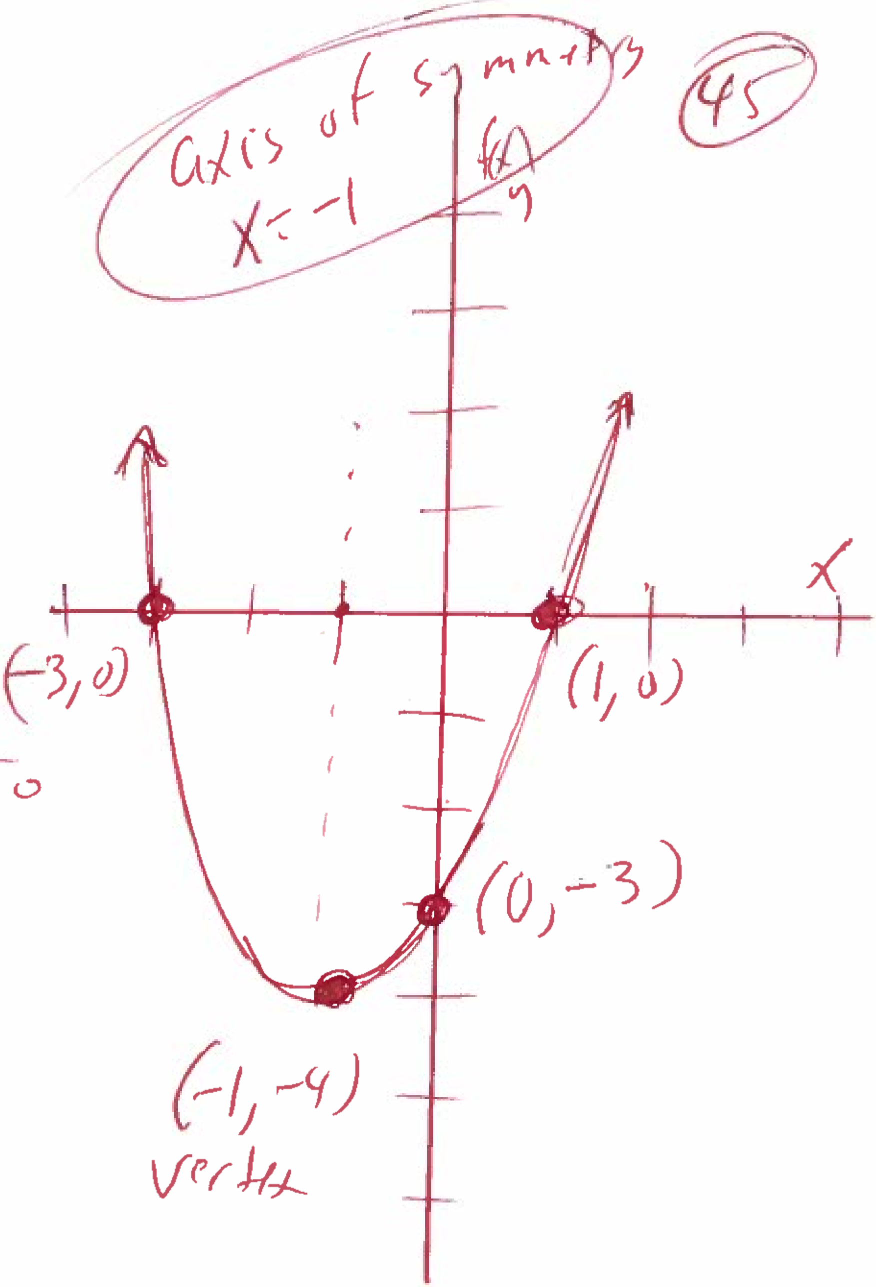
$f(0) = (0)(0) + 2(0) - 3$

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

$f(0) = -3$

$(0, -3)$

45



find vertex

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

$a = 1,\ b = 2,\ c = -3$

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

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

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

Vertex $= (-1, f(-1))$

Vertex $= (-1, (-1)^2 + 2(-1) - 3)$

Vertex $= (-1, (-1)(-1) + 2(-1) - 3)$

Vertex $= (-1, 1 - 2 - 3)$

Vertex $= (-1, 1 - 5)$

Vertex $= (-1, -4)$

domain $(-\infty, \infty)$

range $[-4, \infty)$

OR use graphing calculator

$y_1 = x^2 + 2x - 3$

xmin = -12

xmax = 12

xscl = 1

ymin = -10

ymax = 10

yscl = 1

46.) graph

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

find x-intercept let $y=0$

$0 = f(x) = x^2 + 3x - 4$

$0 = x^2 + 3x - 4$

$0 = (x-1)(x+4)$

and $x-1=0$ or $x+4=0$

$x-1+1=0+1$ or $x+4-4=0-4$

$\boxed{x=1}$ or $\boxed{x=-4}$

(1, 0) or (-4, 0)

---

find y-intercept let $x=0$

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

$f(0)=(0)^2+3(0)-4$

$f(0)=(0)(0)+3(0)-4$

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

$f(0)=-4$

$\boxed{(0,-4)}$

---

find vertex

$f(x)=1x^2+3x-4$

$a=1,\ b=3,\ c=-4$

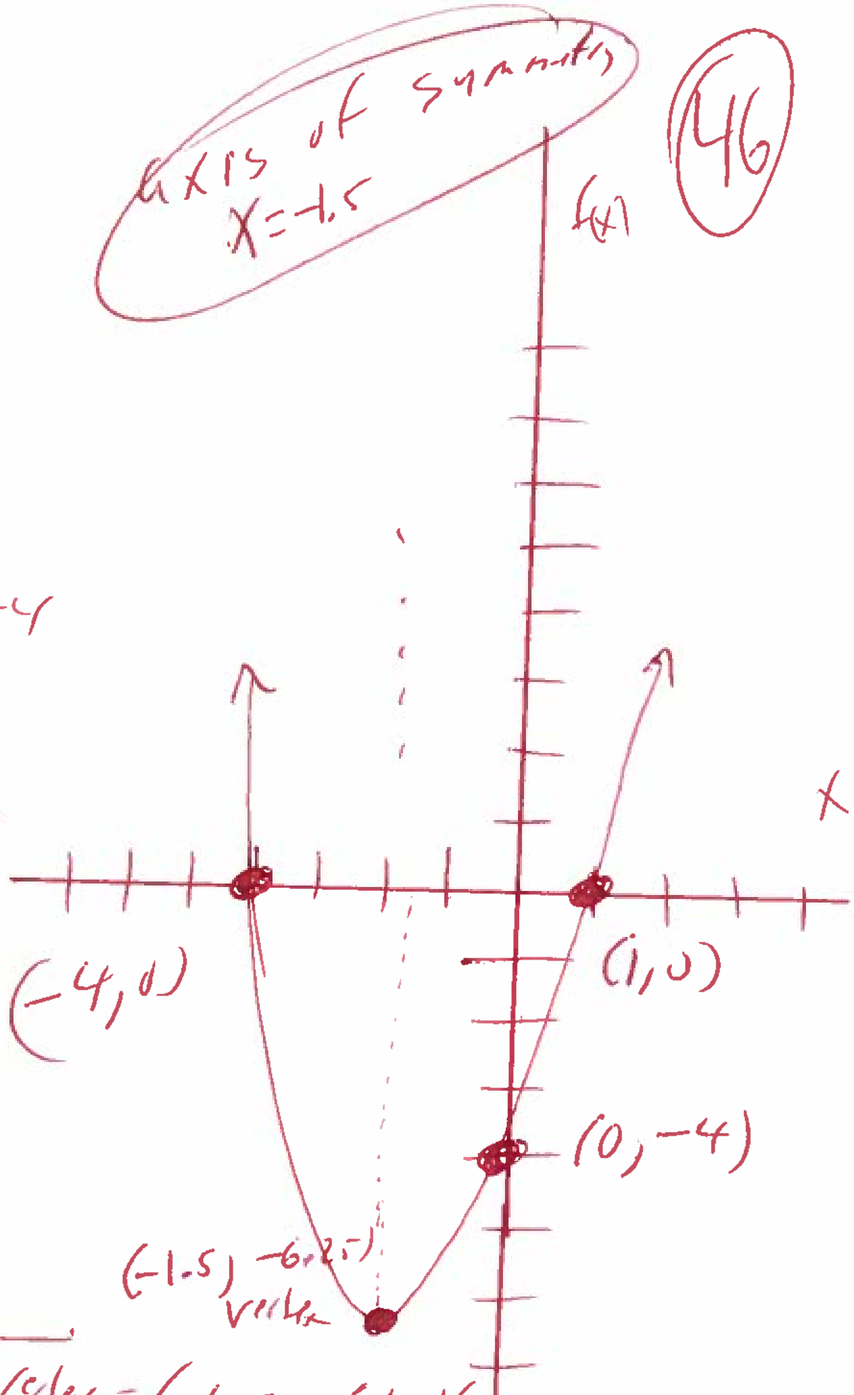
Vertex $= \left(-\frac{b}{2a},\ f\left(-\frac{b}{2a}\right)\right)$

Vertex $= \left(-\frac{(3)}{2(1)},\ f\left(-\frac{(3)}{2(1)}\right)\right)$

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

Vertex $= (-1.5,\ f(-1.5))$

Vertex $= (-1.5,\ (1.5)^2+3(-1.5)-4)$



Vertex $= (-1.5,\ (-1.5)(-1.5)+3(-1.5)-4)$

Vertex $= (-1.5,\ 2.25-4.5-4)$

Vertex $= (-1.5,\ -2.25-4)$

$\boxed{\text{Vertex} = (-1.5,\ -6.25)}$

domain $(-\infty, \infty)$
range $[-6.25, \infty)$

or use graphing calculator
$Y_1 = x^2+3x-4$
Xmin=-12
Xmax=12
Xscl=1
Ymin=-10
Ymax=10
Yscl=1

47. graph

$f(x) = 6x - x^2 - 8$

$y = f(x) = -x^2 + 6x - 8$

find x-intercept let $y = 0$

$0 = f(x) = -x^2 + 6x - 8$

$0 = -x^2 + 6x - 8$

$-1(0) = -1(-x^2 + 6x - 8)$

$0 = x^2 - 6x + 8$

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

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

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

$\boxed{x = 2}$ OR $\boxed{x = 4}$

$\boxed{(2, 0)}$ OR $\boxed{(4, 0)}$

find y-intercept let $x = 0$

$f(x) = -x^2 + 6x - 8$

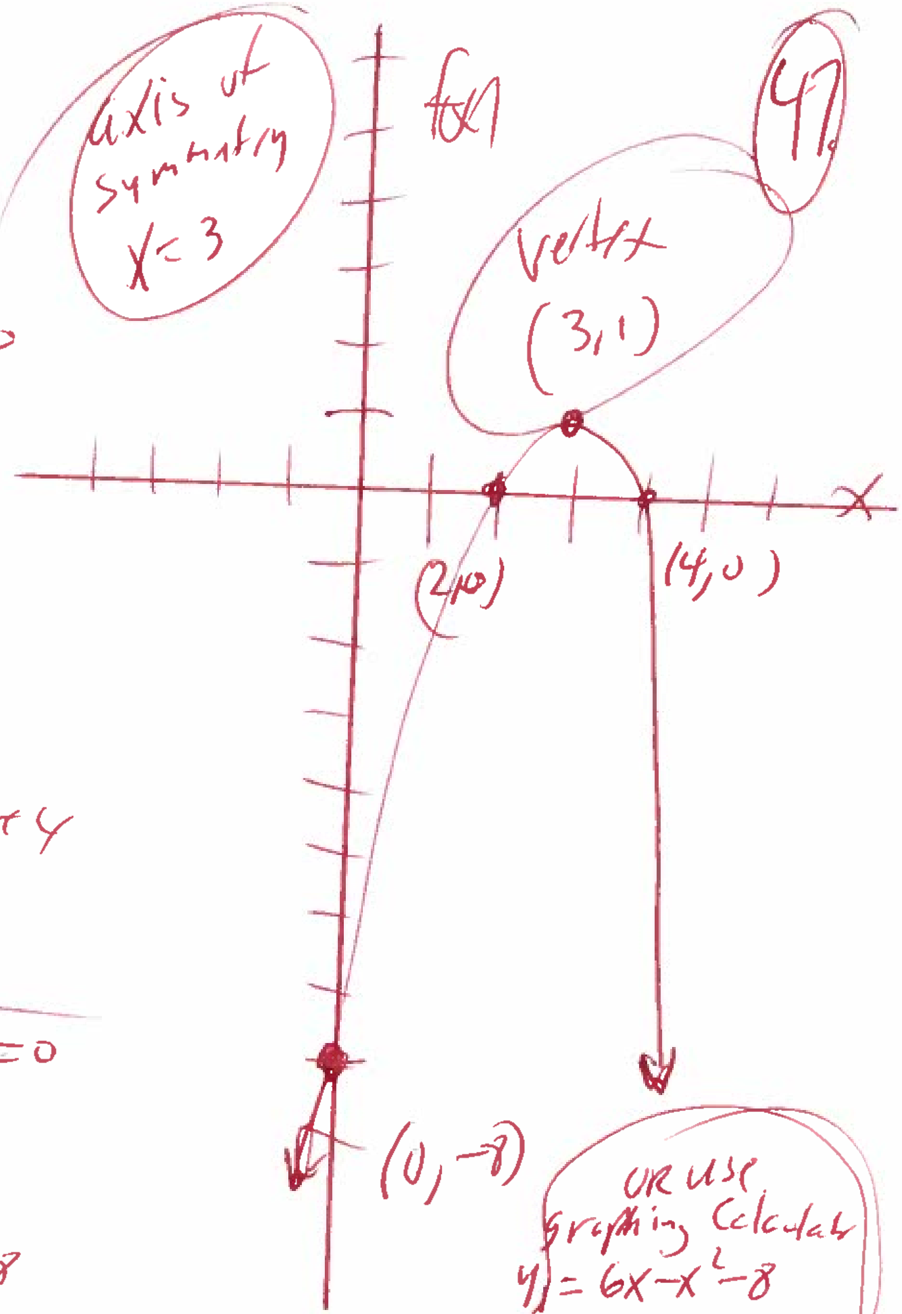
$f(0) = -(0)^2 + 6(0) - 8$

$f(0) = -(0)(0) + 6(0) - 8$

$f(0) = 0 + 0 - 8$

$f(0) = -8$

$\boxed{(0, -8)}$



OR use graphing Calculator

$y = 6x - x^2 - 8$

Xmin = -12
Xmax = 12
Xscl = 1
Ymin = -10
Ymax = 10
Yscl = 1

find vertex $f(x) = -1x^2 + 6x - 8$

$a = -1$, $b = 6$, $c = -8$

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

$\text{Vertex} = \left(-\frac{(6)}{2(-1)}, f\left(-\frac{(6)}{2(-1)}\right)\right)$

$\text{Vertex} = \left(\frac{-6}{-2}, f\left(\frac{-6}{-2}\right)\right)$

$\text{Vertex} = (3, f(3))$

$\text{Vertex} = (3, -(3)^2 + 6(3) - 8)$

$\text{Vertex} = (3, -(3)(3) + 6(3) - 8)$

$\text{Vertex} = (3, -9 + 18 - 8)$

$\boxed{\text{Vertex} = (3, 1)}$

domain $= (-\infty, \infty)$

range $= (-\infty, 1]$

(48)

Solve

$1x^3-13x^2+47x-35=0$

given that $x=1$ is a zero
use Synthetic division

(48)

✓

$$\begin{array}{r|rrrr} 1 & 1 & -13 & 47 & -35 \\ & & 1 & -12 & 35 \\ \hline & 1 & -12 & 35 & \boxed{0} \end{array}$$ Rem

possibly
35·1
7·5

$x^2-12x+35=0$

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

set $x-5=0$ OR $x-7=0$

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

$\boxed{x=5}$ ✓ or $\boxed{x=7}$ ✓

$$\boxed{\{1,\ 5,\ 7\}}$$ ✓

49. Use the Rational Zero theorem to list the possible rational zeros for the given function. 49

$f(x) = 1x^3 + 16x^2 + 17x - 6$

$\frac{\text{Last}}{\text{first}} =$

$\frac{\pm 6}{1} =$

$\frac{\pm 6, \pm 3, \pm 2, \pm 1}{1} =$

$\frac{\pm 6}{1}, \frac{\pm 3}{1}, \frac{\pm 2}{1}, \frac{\pm 1}{1} =$

$\pm 6, \pm 3, \pm 2, \pm 1 =$

Solve

$1x^3-2x^2-25x+50=0$

Possible $\frac{\text{Last}}{\text{First}}$

$\frac{\pm 50}{1} =$

$\frac{\pm 50, \pm 25, \pm 10, \pm 5, \pm 2, \pm 1}{1} =$

$\frac{\pm 50}{1}, \frac{\pm 25}{1}, \frac{\pm 10}{1}, \frac{\pm 5}{1}, \frac{\pm 2}{1}, \frac{\pm 1}{1} =$ Possible

$\pm 50, \pm 25, \pm 10, \pm 5, \pm 2, \pm 1 =$

use synthetic division

$$\begin{array}{r|rrrr} 2 & 1 & -2 & -25 & 50 \\ & & 2 & 0 & -50 \\ \hline & 1 & 0 & -25 & \boxed{0} \end{array}$$ Rem

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

$x^2-25=0$

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

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

formula

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

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

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

$\boxed{x=-5}$ or $\boxed{x=5}$

$\{2, -5, 5\}$

(51) Solve

(51)

$$12x^3+77x^2-48x+7=0$$

$\frac{\text{Last}}{\text{First}} =$

$\frac{\pm 7}{12} =$

$\frac{\pm 7, \pm 1}{12, 6, 4, 3, 2, 1}$ = possible rational roots ✓

$\frac{\pm 7}{12}, \frac{\pm 7}{6}, \frac{\pm 7}{4}, \frac{\pm 7}{3}, \frac{\pm 7}{2}, \frac{\pm 7}{1}, \frac{\pm 1}{12}, \frac{\pm 1}{6}, \frac{\pm 1}{4}, \frac{\pm 1}{3}, \frac{\pm 1}{2}, \frac{\pm 1}{1}$ ✓

$\frac{\pm 1}{1}, \frac{\pm 7}{1}, \pm\frac{1}{2}, \frac{\pm 1}{3}, \frac{\pm 1}{4}, \frac{\pm 1}{6}, \frac{\pm 1}{12}, \frac{\pm 7}{2}, \frac{\pm 7}{3}, \frac{\pm 7}{4}, \frac{\pm 7}{6}, \frac{\pm 7}{12}$ ✓

$$\begin{array}{r|rrrr} -7 & 12 & 77 & -48 & 7 \\ & & -84 & 49 & -7 \\ \hline & 12 & -7 & 1 & \boxed{0} \end{array}$$ Rem

$12x^2-7x+1=0$ possible $12\cdot 1$, $6\cdot 2$, $3\cdot 4$, $1\cdot 1$

$(3x-1)(4x-1)=0$ factor

Let $3x-1=0$ or $4x-1=0$

$3x\cancel{-1}\cancel{+1}=0+1$ or $4x-1+1=0+1$

$3x=1$ or $4x=1$

$\frac{3x}{3}=\frac{1}{3}$ or $\frac{4x}{4}=\frac{1}{4}$

$x=1/3$

$x=1/4$

$\left\{-7, \frac{1}{3}, \frac{1}{4}\right\}$ ✓

(52)

Solve

$f(x) = 1x^4 - 8x^3 + 15x^2 + 58x + 34$

(52)

$\frac{\text{last}}{\text{First}} =$

$\frac{\pm 34}{1}$

$\frac{\pm 34, \pm 17, \pm 2, \pm 1}{1} =$

$\frac{\pm 34}{1}, \frac{\pm 17}{1}, \frac{\pm 2}{1}, \frac{\pm 1}{1} =$

$\pm 34, \pm 17, \pm 2, \pm 1 =$

use synthetic division

$$\begin{array}{r|rrrrr} -1 & 1 & -8 & 15 & 58 & 34 \\ & & -1 & 9 & -24 & -34 \\ \hline & 1 & -9 & 24 & 34 & \boxed{0} \text{ Rem} \end{array}$$

Twice

$$\begin{array}{r|rrrr} -1 & 1 & -9 & 24 & 34 \\ & & -1 & 10 & -34 \\ \hline & 1 & -10 & 34 & \boxed{0} \text{ Rem} \end{array}$$

$1x^2 - 10x + 34 = 0$

$a = 1, \quad b = -10, \quad c = 34$

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

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(34)}}{2(1)}$

$x = \frac{10 \pm \sqrt{100 - 136}}{2}$

$x = \frac{10 \pm \sqrt{-36}}{2}$

$x = \frac{10 \pm 6i}{2}$

$x = 5 \pm 3i$

$x = 5 + 3i$ or $x = 5 - 3i$

Twice

$\{-1, -1, 5+3i, 5-3i\}$

(53.) $f(x) = -x^3 - x^2 + 10x - 8$

53

$\frac{\text{last}}{\text{first}} =$

$\frac{\pm 8}{1}$

$\frac{\pm 8, \pm 4, \pm 2, \pm 1}{1} =$

$\frac{\pm 8}{1}, \frac{\pm 4}{1}, \frac{\pm 2}{1}, \frac{\pm 1}{1} =$

$\pm 8, \pm 4, \pm 2, \pm 1$ Possible rational roots

$$\begin{array}{r|rrrr} 1 & -1 & -1 & 10 & -8 \\ & & -1 & -2 & 8 \\ \hline & -1 & -2 & 8 & \boxed{0} \end{array}$$

use synthetic divis

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

$-1(-x^2 - 2x + 8) = -1(0)$ mult

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

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

[illegible] $x - 2 = 0$ or $x + 4 = 0$

$x - 2 + 2 = 0 + 2$ or $x + 4 - 4 = 0 - 4$

$\boxed{x = 2}$ or $\boxed{x = -4}$

$\boxed{\{1, 2, -4\}}$

(54) graph

$f(x)=(x-4)^2-9$

$f(3)=(3-4)^2-9$

$f(3)=(-1)^2-9$

$f(3)=(-1)(-1)-9$

$f(3)=1-9$

$f(3)=-8$

$f(4)=(4-4)^2-9$

$f(4)=(0)^2-9$

$f(4)=(0)(0)-9$

$f(4)=0-9$

$f(4)=-9$

$f(5)=(5-4)^2-9$

$f(5)=(1)^2-9$

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

$f(5)=1-9$

$f(5)=-8$

Find x-intercep let y=0

$y=f(x)=(x-4)^2-9$

$0=(x-4)^2-9$

$(x-4)^2=9$

$\sqrt{x-4}=\pm\sqrt{9}$

$x-4=\pm 3$

$x-4=-3$ or $x-4=3$

$x-4+4=-3+4$ or $x-4+4=3+4$

$x=1$ ✓ or $x=7$

(1,0) (7,0)

Find y-intercept let x=0

$y=(x-4)^2-9$

$y=(0-4)^2-9$

$y=(-4)^2-9$

$y=(-4)(-4)-9$

$y=16-9$

$y=7$

(0,7)

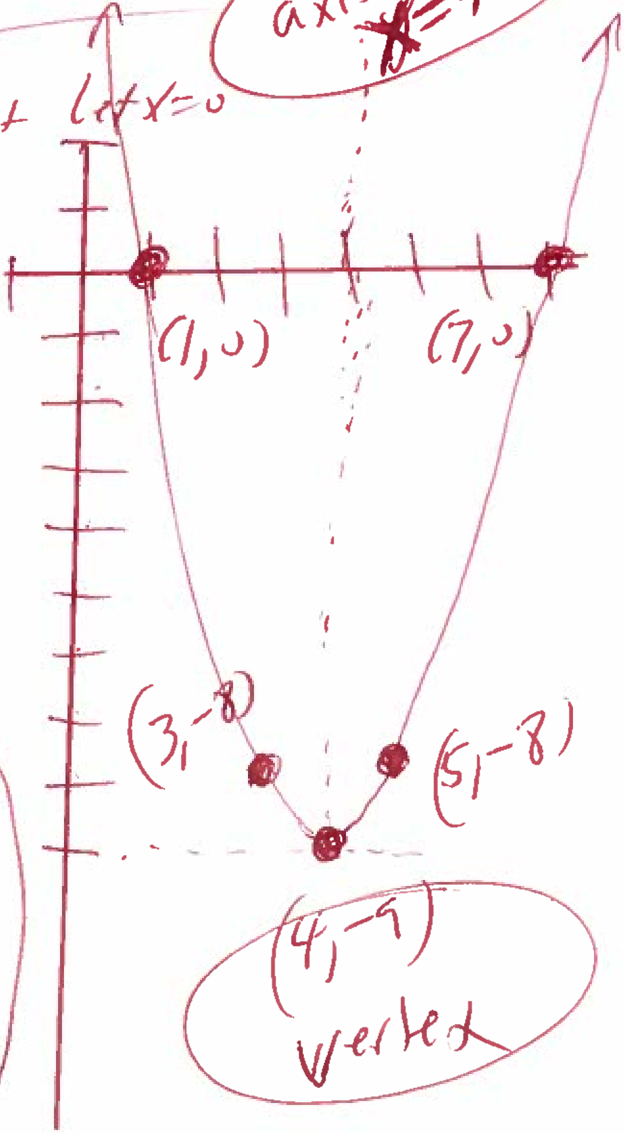
Or use graphing Calculator

$Y_1=(x-4)^2-9$

Xmin=-12
Xmax=12
XScl=1
Ymin=-10
Ymax=10
YScL=1

x	f(x)
3	-8
4	-9
5	-8

54



(55) graph

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

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

find x-intercept let $y = 0$

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

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

$0 = x^2 - 2x - 3$

$0 = (x+1)(x-3)$

set $x+1 = 0$ OR $x-3 = 0$

$x+1-1 = 0-1$ OR $x-3+3 = 0+3$

$x = -1$ or $x = 3$

$(-1, 0)$ OR $(3, 0)$

find y-intercept let $x = 0$

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

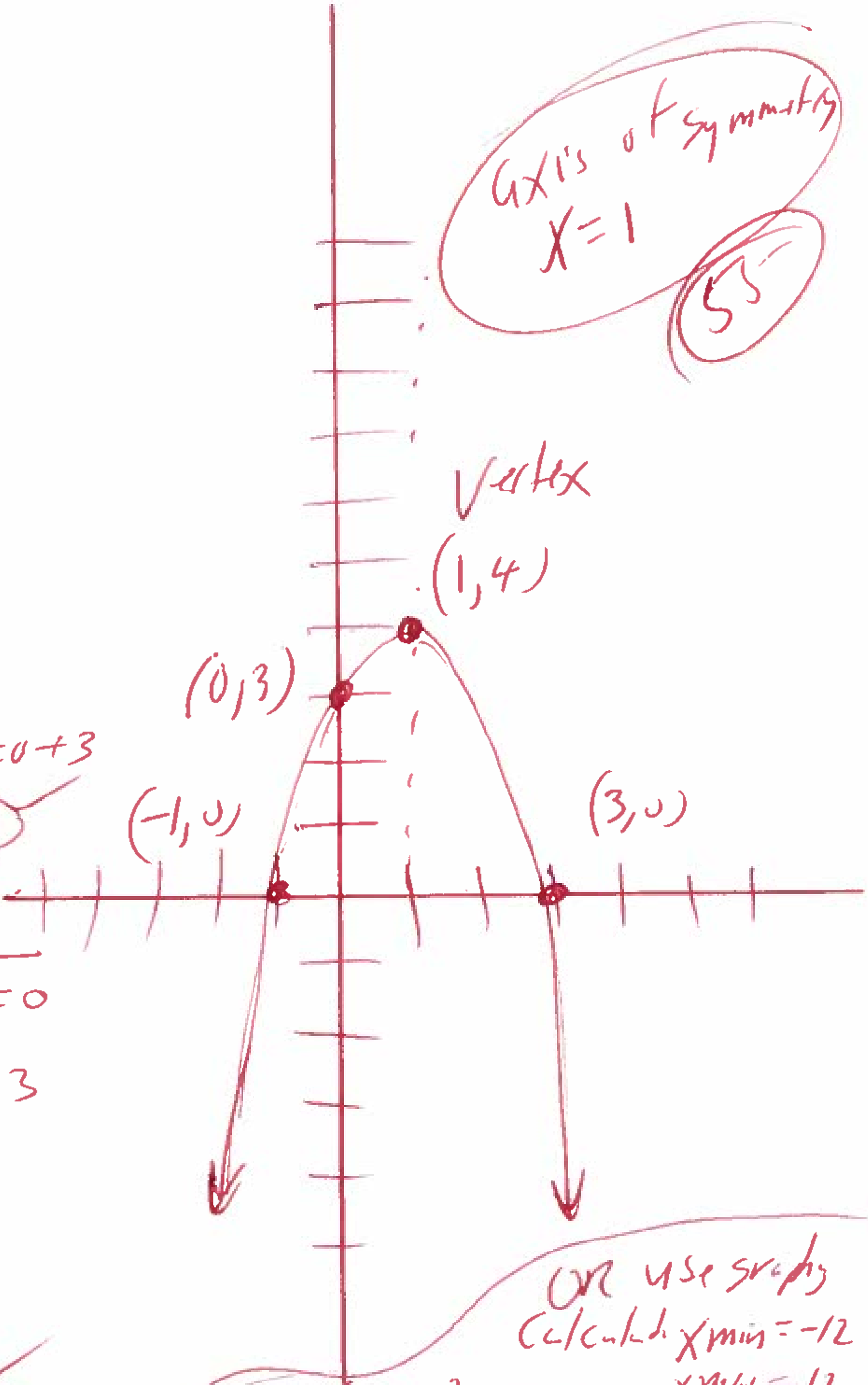
$y = -(0)(0) + 2(0) + 3$

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

$y = 0 + 0 + 3$

$y = 3$

$(0, 3)$



OR use graphing calculator

$y_1 = 2x - x^2 + 3$

xmin = −12
xmax = 12
xscl = 1
ymin = −10
ymax = 10
yscl = 1

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

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

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

$\text{Vertex} = (1, f(1))$

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

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

$a = -1,\ b = 2,\ c = 3$

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

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

$\text{Vertex} = (1, 4)$

(56) Find the horizontal asymptote (56)

$$y = \frac{x-10}{3x^2+x+1}$$

$$\lim_{x\to\infty} \frac{x-10}{3x^2+x+1}$$

$$\lim_{x\to\infty} \frac{(x-10)}{(3x^2+x+1)}\left(\frac{\frac{1}{x^2}}{\frac{1}{x^2}}\right)$$ Mult by

$$\lim_{x\to\infty} \frac{\frac{x}{x^2}-\frac{10}{x^2}}{\frac{3\cancel{x^2}}{\cancel{x^2}}+\frac{x}{x^2}+\frac{1}{x^2}}$$

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

$$\lim_{x\to\infty} \frac{\frac{1}{x}-\frac{10}{x^2}}{3+\frac{1}{x}+\frac{1}{x^2}}$$

$$\frac{0-0}{3+0+0} =$$

$$\frac{0}{3} =$$

$$0 =$$

horizontal asymptote ✓

$y = 0$

57. Find the Slant asymptote

57.

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

OPP use synthetic division

$$\begin{array}{r|rrr} 2 & 4 & -2 & 2 \\ & & 8 & 12 \\ \hline & 4 & 6 & \boxed{14} \end{array}$$

$$\boxed{y = 4x + 6}$$

SLANT Asymptote

58. Find the vertical asymptote

58.

$$f(x) = \frac{x}{x-6}$$

set $x - 6 = 0$

$$x - \cancel{6} + \cancel{6} = 0 + 6$$

$$\boxed{x = 6} \leftarrow \text{Vertical asymptote}$$

(59) find the vertical asymptote

(59)

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

set $x+4=0$

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

$\boxed{x=-4}$ ← vertical asymptote

(60.) find the vertical asymptote

(60)

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

set $x(x-6)=0$

$\boxed{x=0}$ OR $x-6=0$

$x-6+6=0+6$

$\boxed{x=6}$

↑ ↑

Vertical asymptotes

(61.) find the vertical asymptote

(61)

$$f(x) = \frac{x-8}{x^2-10x+16}$$

$$f(x) = \frac{(x-8)}{(x-2)(x-8)}$$

$$f(x) = \frac{1\cancel{(x-8)}}{(x-2)\cancel{(x-8)}}$$

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

set $x-2=0$

$x-2+2=0+2$

$\boxed{x=2}$ vertical asymptote

hole at

$x-8=0$

$x=8$

$\boxed{\text{Hole at } x=8}$

62. find the horizontal asymptote

62

$$f(x) = \frac{14x}{7x^2+5}$$

$$\lim_{x\to\infty} \frac{14x}{7x^2+5}$$

$$\lim_{x\to\infty} \frac{(14x)}{(7x^2+5)}\left(\frac{\frac{1}{x^2}}{\frac{1}{x^2}}\right)$$ Mult by

$$\lim_{x\to\infty} \frac{\frac{14x}{x^2}}{\frac{7x^2}{x^2}+\frac{5}{x^2}}$$

formula

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

$$\lim_{x\to\infty} \frac{\frac{14}{x}}{7+\frac{5}{x^2}}$$

$$\frac{0}{7+0} =$$

$$\frac{0}{7} =$$

$$0 =$$

$y=0$ horizontal asymptote

(63) Find the horizontal asymptote

(63)

$$g(x) = \frac{28x^2}{7x^2+6}$$

$$\lim_{x\to\infty}\left(\frac{28x^2}{7x^2+6}\right) =$$

$$\lim_{x\to\infty}\left(\frac{28x^2}{7x^2+6}\right)\left(\frac{\frac{1}{x^2}}{\frac{1}{x^2}}\right) =$$ mult by

$$\lim_{x\to\infty}\frac{\frac{28\cancel{x^2}}{\cancel{x^2}}}{\frac{7x^2}{x^2}+\frac{6}{x^2}} =$$

formula

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

constant

$$\lim_{x\to\infty} a = a$$

$$\lim_{x\to\infty}\frac{28}{7+\frac{6}{x^2}} =$$

~~$\lim_{x\to\infty}$~~ $$\frac{28}{7+0} =$$

$$\frac{28}{7} =$$

$$4 =$$

$y=4$ horizontal asymptote.

(64) find the horizontal asymptote (64)

$$g(x) = \frac{14x^2}{7x^2+1}$$

$$\lim_{x\to\infty} \frac{14x^2}{7x^2+1} =$$

$$\lim_{x\to\infty} \left(\frac{14x^2}{7x^2+1}\right)\left(\frac{\frac{1}{x^2}}{\frac{1}{x^2}}\right) =$$ mult by

$$\lim_{x\to\infty} \frac{\frac{14x^2}{x^2}}{\frac{7x^2}{x^2}+\frac{1}{x^2}} =$$

formula

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

formula constant

$$\lim_{x\to\infty} a = a$$

$$\lim_{x\to\infty} \frac{14}{7+\frac{1}{x^2}}$$

$$\frac{14}{7+0} =$$

$$\frac{14}{7} =$$

$$2 =$$

$y=2$ horizontal asymptote

(65.) find the horizontal asymptote (65.)

$$f(x) = \frac{-7x+4}{3x+4}$$

$$\lim_{x\to\infty} \frac{-7x+4}{3x+4}$$

$$\lim_{x\to\infty} \left(\frac{-7x+4}{3x+4}\right)\left(\frac{\frac{1}{x}}{\frac{1}{x}}\right)$$ Mult by

$$\lim_{x\to\infty} \frac{\frac{-7x}{x}+\frac{4}{x}}{\frac{3x}{x}+\frac{4}{x}} =$$

formula

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

$$\lim_{x\to\infty} \frac{-7+\frac{4}{x}}{3+\frac{4}{x}}$$

formula constant

$$\lim_{x\to\infty} (a) = a$$

$$\frac{-7+0}{3+0} =$$

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

$y = \frac{-7}{3}$ horizontal asymptote

66. find the domain

$f(x) = \log(13-x)$

set $13 - x > 0$

$\cancel{13} - x - \cancel{13} > 0 - 13$

$-x > -13$

$\frac{-x}{-1} < \frac{-13}{-1}$

$\boxed{x < 13}$

$\boxed{(-\infty, 13)}$

formula
domain

$f(x) = \log(Ax+B)$

set $Ax+B > 0$

↑ only

67 Expand

67

$$\log_b\left(\frac{x^3y}{z^2}\right)$$

$$\log_b(x^3y) - \log_b(z^2) =$$

$$\log_b(x^3) + \log_b(y) - \log_b(z^2) =$$

$$3\log_b(x) + \log_b(y) - 2\log_b(z) =$$

formulas

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

$$\log_b(A \cdot B) = \log_b(A) + \log_b(B)$$

$$\log_b(A^N) = N\log_b(A)$$

68. Expand

68

$$\text{Log}_f \frac{\sqrt{a}\, b^8}{c^2} =$$

$$\text{Log}_f(\sqrt{a}\, b^8) - \text{Log}_f(c^2) =$$

$$\text{Log}_f(\sqrt{a}) + \text{Log}_f(b^8) - \text{Log}_f(c^2) =$$

$$\text{Log}_f(a^{1/2}) + \text{Log}_f(b^8) - \text{Log}_f(c^2) =$$

$$\frac{1}{2}\text{Log}_f(a) + 8\,\text{Log}_f(b) - 2\,\text{Log}_f(c) =$$

formulas

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

$$\text{Log}(AB) = \text{Log}(A) + \text{Log}(B)$$

$$\text{Log}(A^N) = N\,\text{Log}(A)$$

(69.) Expand

(69)

$$\ln\left(\frac{x^3\sqrt{x^2+4}}{(x+4)^7}\right)$$

$$\ln\left(x^3\sqrt{x^2+4}\right) - \ln(x+4)^7 =$$

$$\ln(x^3) + \ln\sqrt{x^2+4} - \ln(x+4)^7 =$$

$$\ln(x^3) + \ln(x^2+4)^{\frac{1}{2}} - \ln(x+4)^7 =$$

$$\boxed{3\ln(x) + \frac{1}{2}\ln(x^2+4) - 7\ln(x+4) =}$$

formulas

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

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

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

(70) Expand

(70)

$$\log\left(\frac{10x^5\sqrt[3]{7-x}}{3(x+4)^2}\right) =$$

$$\log\left(10x^5\sqrt[3]{7-x}\right) - \log\left(3(x+4)^2\right) =$$

$$\left(\log(10)+\log(x^5)+\log\sqrt[3]{7-x}\right) - \left(\log(3)+\log(x+4)^2\right) =$$

$$\left(\log(10)+\log(x^5)+\log(7-x)^{1/3}\right) - \left(\log(3)+\log(x+4)^2\right) =$$

$$\left(\log(10)+5\log(x)+\tfrac{1}{3}\log(7-x)\right) - \left(\log(3)+2\log(x+4)\right) =$$

$$\boxed{\log(10)+5\log(x)+\tfrac{1}{3}\log(7-x)-\log(3)-2\log(x+4) =}$$

$\updownarrow$

OR

$$\boxed{1+5\log(x)+\tfrac{1}{3}\log(7-x)-\log(3)-2\log(x+4)}$$

formulas

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

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

$$\log(A^N) = N\log(A)$$

$$\log(10) = 1$$

71.

Solve

$5^x = 25$

$\cancel{5}^x = \cancel{5}^2$

$x = 2$

70.

formula

$a^x = a^y$

$x = y$

72.

Solve

$$3^{2x-2} = 9$$

$$\cancel{3}^{2x-2} = \cancel{3}^{2}$$

$$2x-2 = 2$$

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

$$2x = 4$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$\boxed{x = 2}$$

72.

formula

$$a^{x} = a^{y}$$

$$x = y$$

73.

Solve

$$25^{x+5} = 625^{x-1}$$

$$(5^{2})^{x+5} = (5^{4})^{x-1}$$

$$\cancel{5}^{2x+10} = \cancel{5}^{4x-4}$$

$$2x+10 = 4x-4$$

$$2x+\cancel{10}-\cancel{10} = 4x-4-10$$

$$2x = 4x-14$$

$$2x-4x = \cancel{4x}-14-\cancel{4x}$$

$$-2x = -14$$

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

$$\boxed{x = 7}$$

73

formula

$$a^{x} = a^{y}$$

$$x = y$$

74

Solve

74.

$$3e^x = 13$$

$$\frac{3e^x}{3} = \frac{13}{3}$$

$$e^x = \frac{13}{3}$$

$$\ln(e^x) = \ln\left(\frac{13}{3}\right)$$

$$x\ln(e) = \ln\left(\frac{13}{3}\right)$$

$$x(1) = \ln\left(\frac{13}{3}\right)$$

$$x = \ln\left(\frac{13}{3}\right)$$ ✓

OR

$$x = 1.466337069$$ ✓

Round

$$x \approx 1.47$$ ✓

formula

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

$$\ln(e) = 1$$

75.

Solve

$$2e^{3x}=1606$$

$$\frac{2e^{3x}}{2}=\frac{1606}{2}$$

$$e^{3x}=803$$

$$\ln(e^{3x})=\ln(803)$$

$$3x\ln(e)=\ln(803)$$

$$3x(1)=\ln(803)$$

$$3x=\ln(803)$$

$$\frac{\cancel{3}x}{\cancel{3}}=\frac{\ln(803)}{3}$$

$$x=\frac{\ln(803)}{3}$$

OR

$$x=2.229451571$$

Round

$$x\approx 2.23$$

75

Formula

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

$$\ln(e)=1$$

Solve

$$e^{2-8x} = 538$$

$$\ln(e^{2-8x}) = \ln(538)$$

$$(2-8x)\ln(e) = \ln(538)$$

$$(2-8x)(1) = \ln(538)$$

$$2-8x = \ln(538)$$

$$\cancel{2} - 8x - \cancel{2} = \ln(538) - 2$$

$$-8x = \ln(538) - 2$$

$$\frac{\cancel{-8}x}{\cancel{-8}} = \frac{(\ln(538)-2)}{-8}$$

$$x = \frac{(\ln(538)-2)}{(-8)}$$

$$x = \frac{-1(\ln(538)-2)}{-1(-8)}$$

$$x = \frac{-\ln(538)+2}{8}$$

$$x = \frac{2-\ln(538)}{8}$$

$$x = -.53598232$$

formula

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

$\ln(e) = 1$

OR Round

$$x \equiv -0.54$$

77

Solve

$$8^{x+3} = 297$$

$$\ln(8^{x+3}) = \ln(297)$$

$$(x+3)\ln(8) = \ln(297)$$

$$\frac{(x+3)\cancel{\ln(8)}}{\cancel{\ln(8)}} = \frac{\ln(297)}{\ln(8)}$$

$$x+3 = \frac{\ln(297)}{\ln(8)}$$

$$x+\cancel{3}-\cancel{3} = \frac{\ln(297)}{\ln(8)} - 3$$

$$\boxed{x = \frac{\ln(297)}{\ln(8)} - 3}$$ ✓

OR

$$\boxed{x = -.2618936264}$$ ✓

OR Round

$$\boxed{x \equiv -0.26}$$ ✓

Formula

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

78. Soln

78.

Formula
$\log(A)+\log(B) = \log(AB)$

$\log_{12}(x)+\log_{12}(11x-1)=1$

$\log_{12}(x)(11x-1)=1$

$12^1 = x(11x-1)$

$12 = 11x^2-1x$

$0 = 11x^2-1x-12$

$0 = 11x^2-x-12$

$0 = (11x-12)(x+1)$

possible
11·1
12·1
6·2
3 4

$\frac{12}{11}$
Answer

Soln $11x-12=0$ OR $x+1=0$

$11x-\cancel{12}+\cancel{12}=0+12$ or $x+1-1=0-1$

$11x=12$ or $\cancel{x=-1}$

$\frac{11x}{11}=\frac{12}{11}$

$x=\frac{12}{11}$ ✓ Good

ck

$\log_{12}\left(\frac{12}{11}\right)+\log_{12}\left(\cancel{11}\left(\frac{12}{\cancel{11}}\right)-1\right)=1$

$\log_{12}\left(\frac{12}{11}\right)+\log_{12}(12-1)=1$

$\log_{12}\left(\frac{12}{11}\right)+\log_{12}(11)=1$

Good Good ✓

ck

$\log_{12}(-1)+\log_{12}(11(-1)-1)=1$

$\log_{12}(-1)+\log_{12}(-11-1)=1$

$\log_{12}(-1)+\log_{12}(-12)=1$

BAD BAD

79. Solve 79.

$\log_4(X+7)+\log_4(X+55)=5$

$\log_4(X+7)(X+55)=5$

formula

$\log(A)+\log(B)=$

$\log(AB)=$

$4^5=(X+7)(X+55)$

$1024=X^2+55X+7X+385$

$1024=X^2+62X+385$

$0=X^2+62X+385-1024$

$0=X^2+62X-639$

$0=(X-9)(X+71)$

Set $X-9=0$ OR $X+71=0$

$X-9+9=0+9$ OR $X+\cancel{71}-\cancel{71}=0-71$

$X=9$ Good or $\cancel{X=-71}$

Ck

$\log_4(9+7)+\log_4(9+55)=5$

$\log_4(16)+\log_4(64)=5$

Good Good

$\boxed{\{9\}}$

$\log_4(-71+7)+\log_4(-71+55)=5$

$\log_4(-64)+\log_4(-16)=5$

BAD BAD

Solve

$\log_4(x+10) - \log_4(x-5) = 2$

$\log_4\left(\frac{x+10}{x-5}\right) = 2$

formula

$\log(A) - \log(B) =$

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

$4^2 = \frac{x+10}{x-5}$

$16 = \frac{x+10}{x-5}$

$\frac{16}{1} = \frac{x+10}{x-5}$

$16(x-5) = 1(x+10)$

$16x - 80 = 1x + 10$

$16x - \cancel{80} + \cancel{80} = 1x + 10 + 80$

$16x = 1x + 90$

$16x - 1x = \cancel{1x} + 90 - \cancel{1x}$

$15x = 90$

$\frac{\cancel{15}x}{\cancel{15}} = \frac{90}{15}$ ✓ Ck

$x = 6$ Good

$\{6\}$

$\log_4(6+10) - \log_4(6-5) = 2$

$\log_4(16) - \log_4(1) = 2$

Good Good

81.

81

Solve

$\log(x)+\log(x+4)=\log(5)$

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

$x(x+4)=5$

$x^2+4x=5$

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

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

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

$x-\cancel{1}+\cancel{1}=0+1$ or $x+\cancel{5}-\cancel{5}=0-5$

$x=1$ ✓ or $\cancel{x=-5}$

Good   BAD

$\{1\}$

ck

$\log(1)+\log(1+4)=\log(5)$

Good   Good   Good ✓

$\log(-5)+\log(-5+4)=\log(5)$

$\log(-5)+\log(-1)=\log(5)$

BAD   BAD

82

Soln

$$28.3 = 23.1e^{0.0153t}$$

$$\frac{28.3}{23.1} = \frac{\cancel{23.1}e^{0.0153t}}{\cancel{23.1}}$$

$$\frac{28.3}{23.1} = e^{0.0153t}$$

$$\ln\left(\frac{28.3}{23.1}\right) = \ln\left(e^{0.0153t}\right)$$

$$\ln\left(\frac{28.3}{23.1}\right) = 0.0153t\ln e)$$

$$\ln\left(\frac{28.3}{23.1}\right) = 0.0153t(1)$$

$$\ln\left(\frac{28.3}{23.1}\right) = 0.0153t$$

$$\frac{\ln\left(\frac{28.3}{23.1}\right)}{0.0153} = \frac{\cancel{0.0153}t}{\cancel{0.0153}}$$

$$13.26988151 = t$$

Round

$$13.0 = t$$

YEAR 2013

$$\begin{array}{r} 2000 \\ +13 \\ \hline 2013 \end{array}$$

82

YEAR Population

(2000, 23.1)

YEAR Population

(2013, 28.3

Original

(83)

$$f(x) = 21(0.955)^x$$

$$1 = 21(0.955)^x$$

$$\frac{1}{21} = \frac{\cancel{21}(0.955)^x}{\cancel{21}}$$

$$\frac{1}{21} = (0.955)^x$$

$$\ln\left(\frac{1}{21}\right) = \ln(0.955)^x$$

$$\ln\left(\frac{1}{21}\right) = x\ln(0.955)$$

$$\frac{\ln\left(\frac{1}{21}\right)}{\ln(0.955)} = \frac{x\cancel{\ln(0.955)}}{\cancel{\ln(0.955)}}$$

$$66.12211155 = x$$

(83)

84

Solve

84.

$$29000 = 12{,}000\left(1+\frac{.0575}{4}\right)^{4t}$$

$$\frac{20{,}000}{12{,}000} = \frac{\cancel{12{,}000}\left(1+\frac{.0575}{4}\right)^{4t}}{\cancel{12{,}000}}$$

$$1.666666 = \left(1+\frac{.0575}{4}\right)^{4t}$$

$$1.666666 = (1+.014375)^{4t}$$

$$1.666666 = (1.014375)^{4t}$$

$$\ln(1.666666) = \ln(1.014375)^{4t}$$

$$\ln(1.666666) = 4t\ln(1.014375)$$

$$\frac{\ln(1.666666)}{\ln(1.014375)} = \frac{4t\ln\cancel{(1.014375)}}{\ln\cancel{(1.014375)}}$$

$$\frac{\ln(1.666666)}{\ln(1.014375)} = 4t$$

$$35.79047278 = 4t$$

$$\frac{35.79047278}{4} = \frac{\cancel{4}t}{\cancel{4}}$$

$$\boxed{8.947618156 = t}$$ ✓ Round

$$\boxed{8.9 = t}$$

85

Solve

$$15000 = 7500e^{.12x}$$

$$\frac{15000}{7500} = \frac{\cancel{7500}e^{.12x}}{\cancel{7500}}$$

$$2 = e^{.12x}$$

$$\ln(2) = \ln(e^{.12x})$$

$$\ln(2) = .12x(\ln(e))$$

$$\ln(2) = .12x(1)$$

$$\ln(2) = .12x$$

$$\frac{\ln(2)}{.12} = \frac{\cancel{.12}x}{\cancel{.12}}$$

$$5.776226505 = x$$

Round

$$5.8 = x$$

85.

formula

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

$\ln(e) = 1$

96.

Solve

96 Original YEAR

YEAR Popula
(2003, 758)

Year Popu
(2013, 1044)

$$1044 = 758e^{0.032t}$$

$$\frac{1044}{758} = \frac{\cancel{758}e^{0.032t}}{\cancel{758}}$$

$$\frac{1044}{758} = e^{0.032t}$$

$$\ln\left(\frac{1044}{758}\right) = \ln\left(e^{0.032t}\right)$$

$$\ln\left(\frac{1044}{758}\right) = 0.032t\left(\ln(e)\right)$$

formula
$\ln(A^n) = n\ln A$
$\ln(e) = 1$

$$\ln\left(\frac{1044}{758}\right) = 0.032t(1)$$

$$\ln\left(\frac{1044}{758}\right) = 0.032t$$

$$\frac{\ln\left(\frac{1044}{758}\right)}{0.032} = \frac{\cancel{0.032t}}{\cancel{0.032}}$$

$$10.00410571 = t$$

New YEAR

$\{2013\}$

Round

$$10 = t$$

~~odd~~ →

$$\begin{array}{r} 2003 \\ +10 \\ \hline 2013 \end{array}$$

New Year

87 Eval if $t = 7424$

$$A = 16e^{-0.000121t}$$

$$A = 16e^{-0.000121(7424)}$$

$$A = 16e^{\wedge}(-0.000121(7424))$$

$$A = 6.516156591$$

Round

$$A = 7$$

formula

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

$$\ln(e) = 1$$

88

$$17 = 100e^{-0.000121t}$$

$$\frac{17}{100} = \frac{\cancel{100}e^{-0.000121t}}{\cancel{100}}$$

$$.17 = e^{-0.000121t}$$

$$\ln(.17) = \ln(e^{-0.000121t})$$

$$\ln(.17) = -0.000121t\ln(e)$$

$$\ln(.17) = -0.000121t(1)$$

$$\ln(.17) = -0.000121t$$

$$\frac{\ln(.17)}{-0.000121} = \frac{\cancel{-0.000121}t}{\cancel{-0.000121}}$$

$$14644.27142 = t$$

✓

Round

$$14644 =$$

✓

88

formula

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

$\ln(e) = 1$

89 Population will double

original percent increase

89

$$6 = 3e^{0.003t}$$

$$\frac{6}{3} = \frac{\cancel{3}e^{0.003t}}{\cancel{3}}$$

$$2 = e^{0.003t}$$

$$\ln(2) = \ln\left(e^{0.003t}\right)$$

$$\ln(2) = 0.003t\ln(e)$$

$$\ln(2) = 0.003t\,(1)$$

$$\ln(2) = 0.003t$$

$$\frac{\ln(2)}{0.003} = \frac{\cancel{0.003}t}{\cancel{0.003}}$$

$$231.0490602 = t$$

Round

$$\boxed{231 = t}$$

Sum

$$x+y=3$$

$$x-y=5$$

$$2x+0=8$$

$$2x=8$$

$$\frac{2x}{2}=\frac{8}{2}$$

$$\boxed{x=4}$$

Subst

$$x+y=3$$

$$(4)+y=3$$

$$4+y=3$$

$$\cancel{4}+y-\cancel{4}=3-4$$

$$\boxed{y=-1}$$

$$\boxed{(x,y)=(4,-1)}$$ ✓

ck

$$x+y=3$$

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

$$4-1=3$$

$$3=3$$ ✓

$$x-y=5$$

$$(4)-(-1)=5$$

$$4+1=5$$

$$5=5$$ ✓

91 Solve

91

$x+y+5z=2$

$x+y+3z=4$

$x+2y-3z=13$

2ND, matrix, Edit, [A], 3x4, enter

$$[A] = \begin{bmatrix} 1 & 1 & 5 & 2 \\ 1 & 1 & 3 & 4 \\ 1 & 2 & -3 & 13 \end{bmatrix}$$

2ND Quit

2ND, matrix, **Math**, rref, enter

rref($\overset{\text{2ND matrix}}{[A]}$) = enter

$$\begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

$(x, y, z) = (4, 3, -1)$

92.

92

Solve

$$4x + 4y + 8z = 16$$
$$4x + 3y + 5z = 14$$
$$4x + 6y + 6z = 28$$

2ND, matrix, edit, [A] 3×4, enter

$$[A] = \begin{bmatrix} 4 & 4 & 8 & 16 \\ 4 & 3 & 5 & 14 \\ 4 & 6 & 6 & 28 \end{bmatrix}$$

2ND Quit

2ND, matrix, Math, rref, enter

rref($\overset{\text{2ND matrix}}{[A]}$) enter

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

$$(x, y, z) = (1, 5, -1)$$

93,

93,

Solve

$x+y-z=-4$

$4x-y+z=-1$

$-x+3y-2z=1$

2ND, matrix, Edit, [A], 3x4, enter

$$[A]=\begin{bmatrix}1&1&-1&-4\\4&-1&1&-1\\-1&3&-2&1\end{bmatrix}$$

2ND Quit

2ND, matrix, Math, rref, enter

$\text{rref}\left(\overset{\text{2ND matrix}}{[A]}\right)$ enter =

$$\begin{bmatrix}1&0&0&-1\\0&1&0&6\\0&0&1&9\end{bmatrix}$$

$(x,y,z)=(-1,6,9)$

Stop 4

$\sum X(X+4) =$

Start $X=1$

← use X its ok

99

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

$1(5) + 2(6) + 3(7) + 4(8) =$

$5 + 12 + 21 + 32 =$

$\boxed{70 =}$

Ti 84 (only) use graphing calculator

Math

Summation Σ

$$\sum_{\square=\square}^{\square} \square$$

$$\sum_{X=1}^{4} X(X+4) =$$

$\boxed{70 =}$

95.

$$\sum_{x=1}^{30} (-8x+1)$$

use x

its OK.

95.

$a_1 = (-8(1)+1) = (-8+1) = -7$ ✓

$a_2 = (-8(2)+1) = (-16+1) = -15$ ✓

$a_3 = (-8(3)+1) = (-24+1) = -23$ ✓

$a_{30} = (-8(30)+1) = (-240+1) = -239$ ✓

use graphing calculator

Math

Summation Σ

$$\sum_{\square=\square}^{\square} \square =$$

$$\sum_{x=1}^{30} (-8x+1) =$$

$$-3690 =$$

96 use the Binomial Theorem

96.

$(x+7)^3$

$${}_3C_0(x)^3(7)^0 + {}_3C_1(x)^2(7)^1 + {}_3C_2(x)^1(7)^2 + {}_3C_3(x)^0(7)^3 =$$

$$(1)(x^3)(1) + (3)(x^2)(7) + (3)(x)(49) + (1)(1)(343) =$$

$$\boxed{x^3 + 21x^2 + 147x + 343 =}$$

use graphing calculator

3, math, Prb, nCR, enter, 0, enter = 1
3, math, Prb, nCr, enter, 1, enter = 3
3, math, Prb, nCr, enter, 2, enter = 3
3, math Prb, nCr, enter, 3, enter = 1

97 use the Binomial Theorem 97

$(8x+y)^3$

${}_3C_0(8x)^3(y)^0 + {}_3C_1(8x)^2(y)^1 + {}_3C_2(8x)^1(y)^2 + {}_3C_3(8x)^0(y)^3 =$

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

$(1)(512x^3)(1) + (3)(64x^2)(y) + (3)(8x)(y^2) + (1)(1)(y^3) =$

$512x^3 + 192x^2y + 24xy^2 + y^3 =$

use graphing calculator

3, Math, Prb, nCr, enter, 0, enter = 1

3, Math, Prb, nCr, enter, 1, enter = 3

3, Math, Prb, nCr, enter, 2, enter = 3

3, Math, Prb, nCr, enter, 3, enter = 1

98. Use the Binomial theorem 98.

$(3x-2)^3 =$

${}_3C_0 (3x)^3(-2)^0 + {}_3C_1 (3x)^2(-2)^1 + {}_3C_2 (3x)^1(-2)^2 + {}_3C_3 (3x)^0(-2)^3 =$

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

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

$\boxed{27x^3 - 54x^2 + 36x - 8 =}$

Use graphing Calculator

3, math, Prb, nCr, enter, 0, enter = 1
3, math, Prb, nCr, enter, 1, enter = 3
3, math, Prb, nCr, enter, 2, enter = 3
3, math, Prb, nCr, enter, 3, enter = 1

99 Write the 1st three terms 99

$(x+5)^7 =$

${}_7C_0 (x)^7(5)^0 + {}_7C_1 (x)^6(5)^1 + {}_7C_2 (x)^5(5)^2 =$

$(1)(x^7)(1) + (7)(x^6)(5) + (21)(x^5)(25) =$

$x^7 + 35x^6 + 525x^5 =$

Use graphing calculator

7, Math, Prb, nCR, enter, 0, enter, = 1

7, Math, Prb, nCR, enter, 1, enter, = 7

7, Math, Prb, nCR, enter, 2, enter, = 21