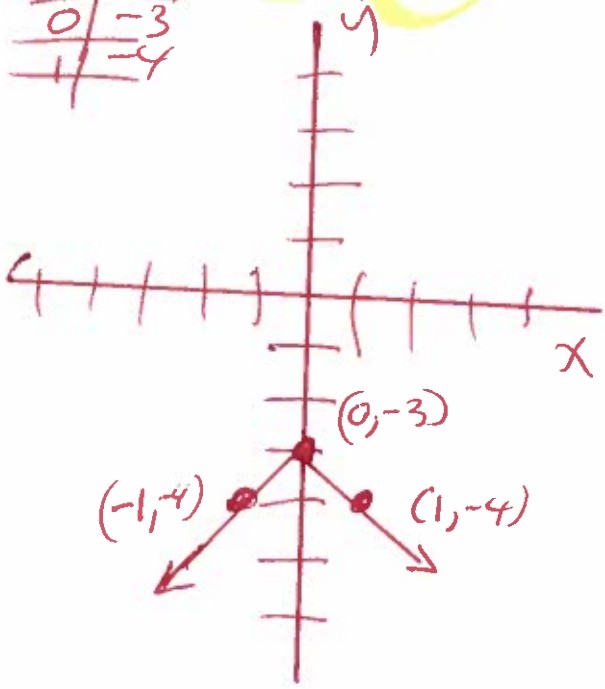
M13141102*p

① Graph $y = -|x| - 3$

| x | y |
|---|---|
| -1 | -4 |
| 0 | -3 |
| 1 | -4 |

c1-30-17




$y = -|-1| - 3$

$y = -(1) - 3$

$y = -1 - 3$

$y = -4$

$y = -|0| - 3$

$y = -(0) - 3$

$y = 0 - 3$

$y = -3$

$y = -(1) - 3$

$y = -1 - 3$

$= -4$

② $(5 - 6i)(-5 + 4i) =$

$-25 + 20i + 30i - 24i^2 =$

$-25 + 50i - 24i^2 =$

$-25 + 50i - 24(-1) =$

$-25 + 50i + 24 =$

$-1 + 50i =$

$i^2 = -1$

(3) $\frac{7}{8-i} =$

(2)

$$\left(\frac{7}{8-i}\right)\left(\frac{8+i}{8+i}\right) =$$

$$\frac{56+7i}{64+8i-8i-i^2} =$$

$$\frac{56+7i}{64-i^2} =$$

formula $i^2 = -1$

$$\frac{56+7i}{64-(-1)} =$$

$$\frac{8+7i}{64+1} =$$

$$\frac{56+7i}{65} =$$

$$\frac{56}{65} + \frac{7}{65}i =$$

(4.) $x^2+7x-60=0$

$(x-5)(x+12)=0$

60.1
30.2
20.3
10.6
5.12
possible

3.

Let $x-5=0$ OR $x+12=0$

$x-5+5=0+5$ OR $x+12-12=0-12$

$x=5$ OR $x=-12$

(5.) $16x^2+32x+15=0$

16.1
8.2
4.4

15.1
3.5
possible

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

Let $4x+3=0$ OR $4x+5=0$

$4x+3-3=0-3$ OR $4x+5-5=0-5$

$4x=-3$ OR $4x=-5$

$\frac{4x}{4}=\frac{-3}{4}$ OR $\frac{4x}{4}=\frac{-5}{4}$

$x=-\frac{3}{4}$ OR $x=-\frac{5}{4}$

(6.) $(4x+2)^2=36$

$\sqrt{(4x+2)^2}=\pm\sqrt{36}$

$4x+2=\pm 6$

$4x+2=-6$ OR $4x+2=6$

$4x+2-2=-6-2$ OR $4x+2-2=6-2$

$4x=-8$ OR $4x=4$

$\frac{4x}{4}=\frac{-8}{4}$ OR $\frac{4x}{4}=\frac{4}{4}$

$x=-2$ OR $x=1$

7. $x^2+12x+72=0$ (Solve use complete the square)

$x^2+12x = -72$

$x^2+12x+\left(\frac{1}{2}(12)\right)^2 = -72+\left(\frac{1}{2}(12)\right)^2$

$x^2+12x+(6)^2 = -72+(6)^2$

$x^2+12x+36 = -72+36$

$(x+6)(x+6) = -36$

$(x+6)^2 = -36$

$\sqrt{(x+6)^2} = \pm\sqrt{-36}$

$x+6 = \pm 6i$

$x+6-6 = \pm 6i - 6$

$x = -6 \pm 6i$ rewrite

$x = -6-6i$ OR $x = -6+6i$

4.

Formula

$\sqrt{-1} = i$

$\sqrt{-36} = 6i$

(8.) $1x^2+4x-96=0$ Solve (use Quad formula)

$a=1,\ b=4,\ c=-96$

$51$

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

$$x=\frac{-(4)\pm\sqrt{(4)^2-4(1)(-96)}}{2(1)}$$

$$x=\frac{-4\pm\sqrt{16+384}}{2}$$

$$x=\frac{-4\pm\sqrt{400}}{2}$$

$$x=\frac{-4\pm20}{2}$$

$x=-2\pm10$

$x=-2-10$ OR $x=-2+10$

$x=-12$ OR $x=8$

(9.) $7x^2+8x+2=0$ Solve (use Quad formula)

6

$a=7,\ b=8,\ c=2$

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

$$x=\frac{-(8)\pm\sqrt{(8)^2-4(7)(2)}}{2(7)}$$

$$x=\frac{-8\pm\sqrt{64-56}}{14}$$

$$x=\frac{-8\pm\sqrt{8}}{14}$$

$$x=\frac{-8\pm\sqrt{4*2}}{14}$$

$$x=\frac{-8\pm\sqrt{4}\sqrt{2}}{14}$$

$$x=\frac{-8\pm2\sqrt{2}}{14}$$

$$x=\frac{2(-4\pm1\sqrt{2})}{2(7)}$$ factor numbers

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

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

Primes
2, 3, 5, 7, 11, 13, ...

Factor

2 | 8
2 | 4
2 | 2
1

$8=2\cdot2\cdot2$

(10) $1x^2+12x+52=0$ Solve (use Quad formula)

$a=1,\ b=12,\ c=52$

(1)

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

$$x=\frac{-(12)\pm\sqrt{(12)^2-4(1)(52)}}{2(1)}$$

$$x=\frac{-12\pm\sqrt{144-208}}{2}$$

$$x=\frac{-12\pm\sqrt{-64}}{2}$$

$$x=\frac{-12\pm 8i}{2}$$

$$x=-6\pm 4i$$

$\sqrt{-1}=i$ formula

$\sqrt{-64}=8i$

$x=-6-4i$ OR $x=-6+4i$

(11) $9x^2 - 71x - 8 = 0$ use Quadratic formula

8.

$a = 9,\ b = -71,\ c = -8$

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

$$x = -\frac{(-71) \pm \sqrt{(-71)^2 - 4(9)(-8)}}{2(9)}$$

$$x = \frac{71 \pm \sqrt{5041 + 288}}{18}$$

$$x = \frac{71 \pm \sqrt{5329}}{18}$$

$$x = \frac{71 \pm 73}{18}$$

$x = \frac{71 - 73}{18}$ or $x = \frac{71 + 73}{18}$

$x = \frac{-2}{18}$ or $x = \frac{144}{18}$

$x = \frac{2(-1)}{2(9)}$ OR $x = 8$

$x = -\frac{1}{9}$ or $x = 8$

(12) $6x^2 = -12x - 5$

Use Quadratic formula

$6x^2 + 12x + 5 = 0$

$a = 6,\ b = 12,\ c = 5$

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

$$x = \frac{-(12) \pm \sqrt{(12)^2 - 4(6)(5)}}{2(6)}$$

$$x = \frac{-12 \pm \sqrt{144 - 120}}{12}$$

$$x = \frac{-12 \pm \sqrt{24}}{12}$$

$$x = \frac{-12 \pm \sqrt{4 \cdot 6}}{12}$$

$$x = \frac{-12 \pm \sqrt{4}\sqrt{6}}{12}$$

$$x = \frac{-12 \pm 2\sqrt{6}}{12}$$

$$x = \frac{2(-6 \pm 1\sqrt{6})}{2(6)}$$

$$x = \frac{-6 \pm 1\sqrt{6}}{6}$$

$$x = \frac{-6 \pm \sqrt{6}}{6}$$

$$x = \frac{-6 + \sqrt{6}}{6} \quad \text{or} \quad x = \frac{-6 - \sqrt{6}}{6}$$

Primes: 2, 3, 5, 7, 11, 13 ...

$24$
$2 \mid 12$
$2 \mid 6$
$3 \mid 3$
$1$

(13) $1x^2 + 14x + 38 = 0$

Use Quadratic formula (10.)

$a = 1,\ b = 14,\ c = 38$

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

$$x = -\frac{(14) \pm \sqrt{(14)^2 - 4(1)(38)}}{2(1)}$$

$$x = -\frac{14 \pm \sqrt{196 - 152}}{2}$$

$$x = -\frac{14 \pm \sqrt{44}}{2}$$

$$x = -\frac{14 \pm \sqrt{4 \cdot 11}}{2}$$

$$x = -\frac{14 \pm \sqrt{4}\sqrt{11}}{2}$$

$$x = -\frac{14 \pm 2\sqrt{11}}{2}$$

$$x = -7 \pm 1\sqrt{11}$$

$$x = -7 \pm \sqrt{11}$$

$x = -7 - \sqrt{11}$ OR $x = -7 + \sqrt{11}$

Primes 2, 3, 5, 7, 11, 13, ...

$2 \mid 44$

$2 \mid 22$

$11 \mid 11$

$1$

(14) $x^3+4x^2-x-4=0$ Solve by factoring group

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

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

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

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

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

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

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

Set $x+4=0$ OR $x+1=0$ OR $x-1=0$

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

$x=-4$ OR $x=-1$ OR $x=1$

(15) $\sqrt{x+1}=2$

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

$x+1=4$

$x+1-1=4-1$

$x=3$

(16) $\sqrt{25x-4} = x+6$

$(\sqrt{25x-4})^2 = (x+6)^2$

$25x-4 = (x+6)(x+6)$

$25x-4 = x^2+6x+6x+36$

$25x-4 = x^2+12x+36$

$0 = x^2+12x+36-25x+4$

$0 = x^2-13x+40$

$x^2-13x+40 = 0$

$(x-5)(x-8) = 0$

so $x-5=0$ or $x-8=0$

$x-5+5=0+5$ or $x-8+8=0+8$

$x=5$ or $x=8$

Good Good

Ck $\sqrt{25x-4} = x+6$

$\sqrt{25(5)-4} = (5)+6$

$\sqrt{125-4} = 5+6$

$\sqrt{121} = 5+6$

$11 = 11$ ✓

Good

Ck $\sqrt{25x-4} = x+6$

$\sqrt{25(8)-4} = (8)+6$

$\sqrt{200-4} = 8+6$

$\sqrt{196} = 8+6$

$14 = 14$ ✓

Good

$\{5, 8\}$

(12)

17. $x - \sqrt{3x-2} = 4$

$-\sqrt{3x-2} = 4 - x$ Rewrite

$-1(-\sqrt{3x-2}) = -1(4-x)$ Mult

$\sqrt{3x-2} = -4+x$

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

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

$3x-2 = 16 - 4x - 4x + x^2$

$3x-2 = x^2 - 8x + 16$

$0 = x^2 - 8x + 16 - 3x + 2$

$0 = x^2 - 11x + 18$

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

Let $x-2=0$ OR $x-9=0$

$x-2+2 = 0+2$ OR $x-9+9 = 0+9$

$x = 2$ BAD OR $x = 9$ Good

Ck $x - \sqrt{3x-2} = 4$

$(2) - \sqrt{3(2)-2} = 4$

$2 - \sqrt{6-2} = 4$

$2 - \sqrt{4} = 4$

$2 - 2 = 4$

$0 \neq 4$

No

Ck $x - \sqrt{3x-2} = 4$

$(9) - \sqrt{3(9)-2} = 4$

$9 - \sqrt{27-2} = 4$

$9 - \sqrt{25} = 4$

$9 - 5 = 4$

$4 = 4$

Yes

$\{9\}$

13.

(18) $|4x+8|+6=15$

$|4x+8|+6-6=15-6$

$|4x+8|=9$

form
$|x|=a$
$x=-a$ or $x=a$

14

$4x+8=-9$ or $4x+8=9$

$4x+8-8=-9-8$ or $4x+8-8=9-8$

$4x=-17$ or $4x=1$

$\frac{4x}{4}=\frac{-17}{4}$ or $\frac{4x}{4}=\frac{1}{4}$

$x=\frac{-17}{4}$ or $x=\frac{1}{4}$

(19) $|x-5|<7$

form
$|x|<a$
$-a<x<a$

$-7<x-5<7$

$-7+5<x-5+5<7+5$

$-2<x<12$ ✓


✓

$(-2, 12)$ ✓

(20.) $3 + \left|1 - \frac{x}{2}\right| \geq 5$

form

$|x| > a$

$x < -a$ or $x > a$

(15)

$3 + \left|1 - \frac{x}{2}\right| - 3 \geq 5 - 3$

$\left|1 - \frac{x}{2}\right| \geq 2$

$1 - \frac{x}{2} \leq -2$ OR $1 - \frac{x}{2} \geq 2$

$1 - \frac{x}{2} - 1 \leq -2 - 1$ OR $1 - \frac{x}{2} - 1 \geq 2 - 1$

$-\frac{x}{2} \leq -3$ OR $-\frac{x}{2} \geq 1$

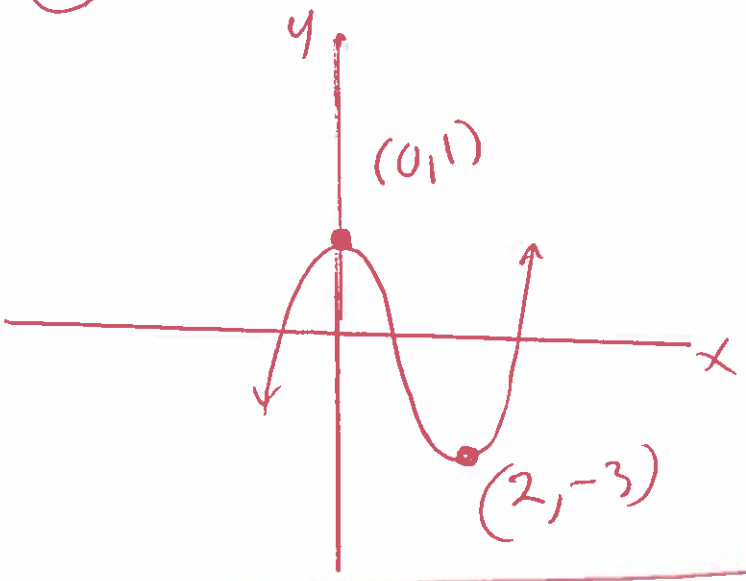
$-2\left(-\frac{x}{2}\right) \geq -2(-3)$ multiply turn alligator $-2\left(-\frac{x}{2}\right) \leq -2(1)$

$x \geq 6$ OR $x \leq -2$ ✓


✓

$(-\infty, -2] \cup [6, \infty)$

(21) Find relative max or min.




16.

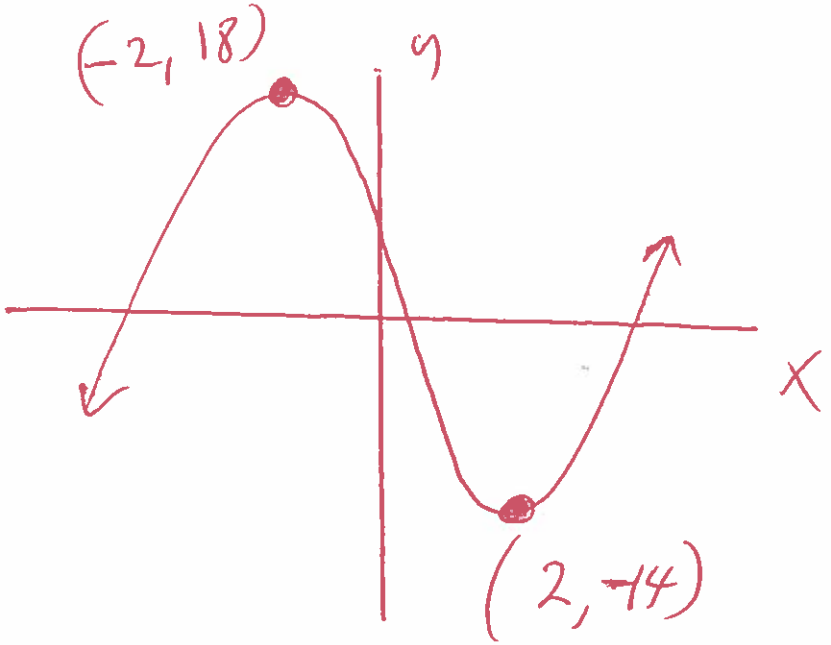
$f(x) = x^3 - 3x^2 + 1$

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

use graphing calculator

Max = (0, 1) and Min = (2, -3)

(22.) Find relative max or min.




$f(x) = x^3 - 12x + 2$

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

use graphing calculator

Max = (-2, 18) and Min (2, -14)

(23.) Evaluate the piecewise function at the given value of the independent variable.

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

find $f(-1)$ (17.)

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

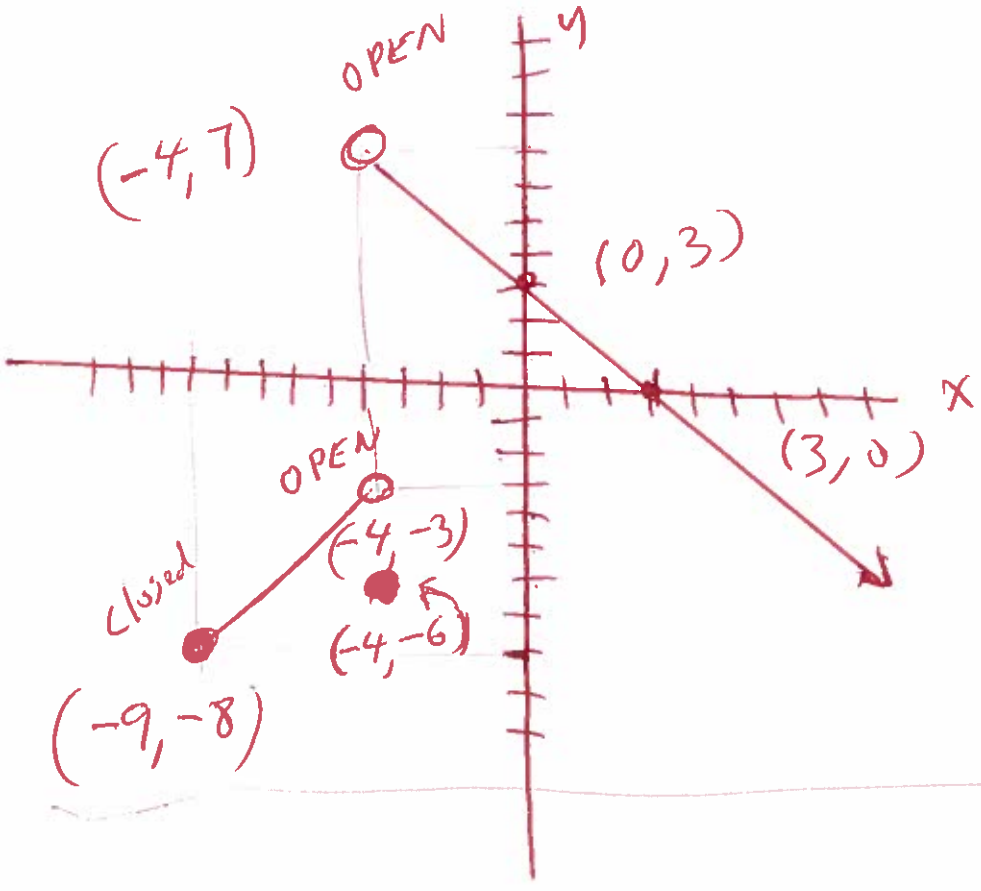
$f(-1) = 2 + 4$

$f(-1) = 6$ OR $(-1, 6)$

(24.) Graph the function (piecewise)

$$f(x) = \begin{cases} x + 1 & \text{if } -9 \leq x < -4 \\ -6 & \text{if } x = -4 \\ -x + 3 & \text{if } x > -4 \end{cases}$$

use graphing calculator



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

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

(18)

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

$\frac{((x+h)^2+2(x+h)-8)-(x^2+2x-8)}{h} =$

$\frac{(x+h)(x+h)+2x+2h-8-x^2-2x+8}{h} =$

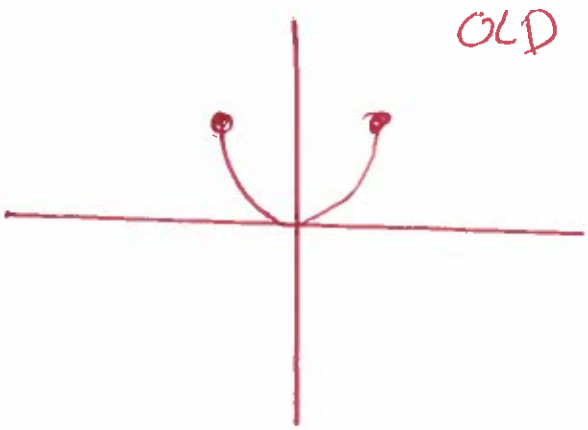
$\frac{x^2+xh+xh+h^2+2x+2h-8-x^2-2x+8}{h} =$

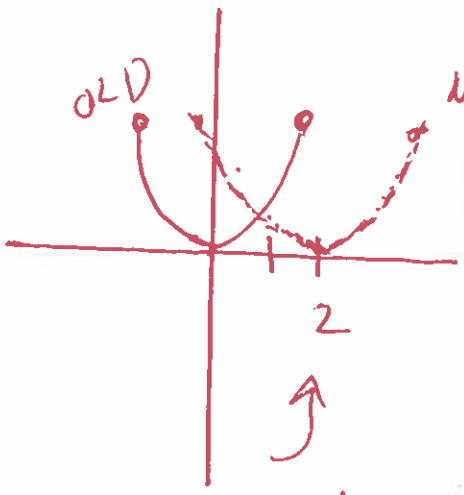
$\frac{xh+xh+h^2+2h}{h} =$

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

$2x+h+2 =$

(26.) graph $g(x) = f(x-2)$ No Calculator




Shift 2 to right

(27.) graph (or use graphing calculator)

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

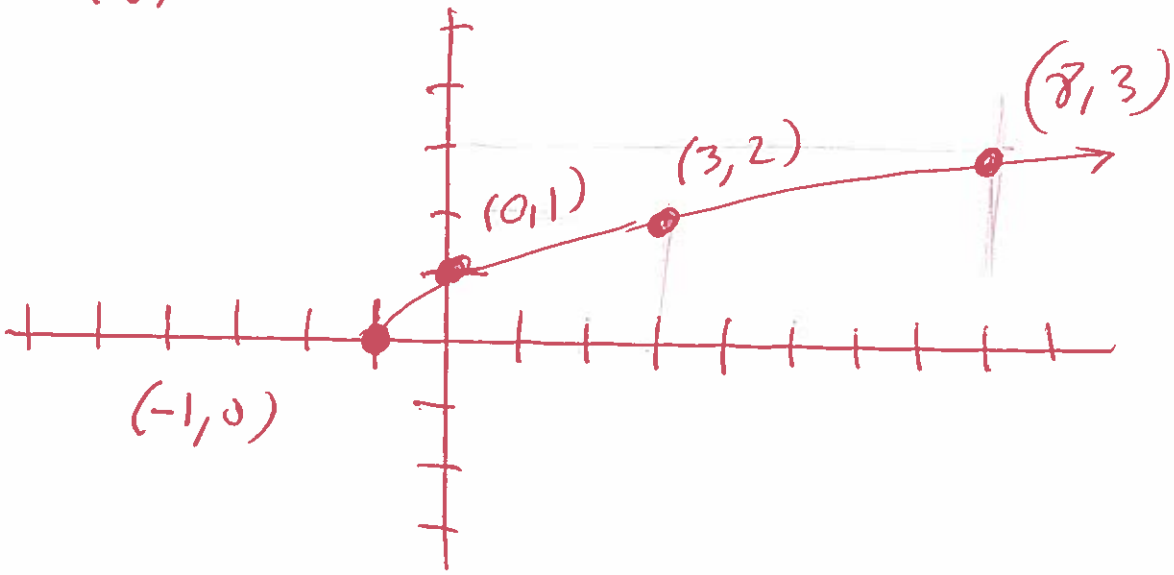
| x | h(x) |
|---|---|
| -1 | 0 |
| 0 | 1 |
| 3 | 2 |
| 8 | 3 |

$h(-1) = \sqrt{-1+1} = \sqrt{0} = 0$

$h(0) = \sqrt{0+1} = \sqrt{1} = 1$

$h(3) = \sqrt{3+1} = \sqrt{4} = 2$

$h(8) = \sqrt{8+1} = \sqrt{9} = 3$



(28.) graph (or use a graphing calculator)

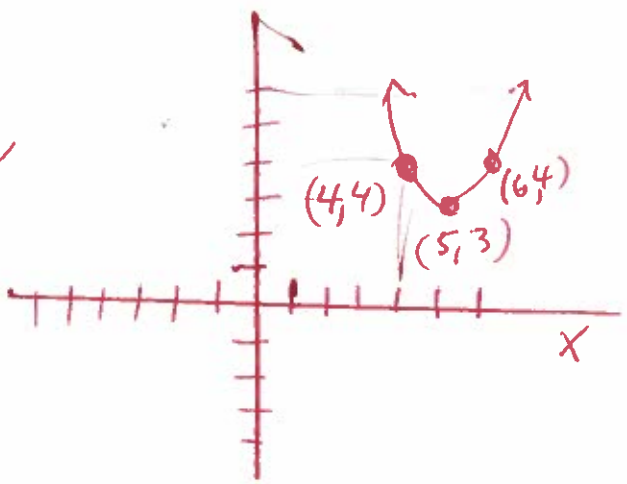
$h(x) = (x-5)^2 + 3$

| x | h(x) |
|---|---|
| 4 | 4 |
| 5 | 3 |
| 6 | 4 |

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

$h(5) = (5-5)^2+3 = (0)^2+3 = (0)(0)+3$
$= 0+3$
$= 3$

$h(6) = (6-5)^2+3 = (1)^2+3 = (1)(1)+3$
$= 1+3$
$= 4$



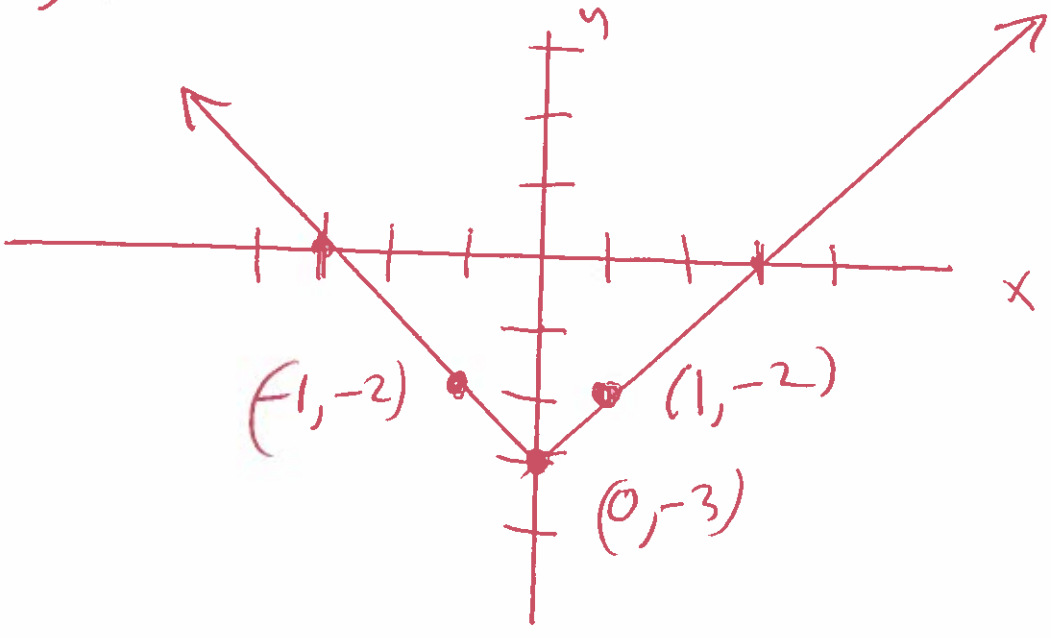

(29.) graph $g(x) = |x|-3$ (or use graphs calculator)

| x | g(x) |
|---|---|
| -1 | -2 |
| 0 | -3 |
| 1 | -2 |

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

$g(0) = |0|-3 = (0)-3 = 0-3 = -3$

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



(30) Find the domain

$f(x) = \sqrt{12 - x}$

set $12 - x \geq 0$

$12 - x - 12 \geq 0 - 12$

$-x \geq -12$

$\frac{-x}{-1} \leq \frac{-12}{-1}$

$x \leq 12$

form domain

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

Set $Ax + B \geq 0$

(21)


$(-\infty, 12]$

(31) $f(x) = 9x - 7$ and $g(x) = 4x - 9$

find $f - g =$

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

$(9x - 7) - (4x - 9) =$

$9x - 7 - 4x + 9 =$

$5x + 2 =$

(32) $f(x) = 5x^2 - 8x$ $\quad g(x) = x^2 - 4x - 32$

find $\frac{f}{g} =$

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

$\frac{5x^2 - 8x}{x^2 - 4x - 32}$

(33.) $f(x) = 7 - 5x$ and $g(x) = -2x + 5$

(22)

Find $f + g =$

Sum

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

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

$7 - 5x - 2x + 5 =$

$-7x + 12 =$

(34.) $f(x) = 5x - 6$ and $g(x) = 8x + 9$

Find $f \cdot g =$

Product

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

$(5x - 6)(8x + 9) =$

$40x^2 + 45x - 48x - 54 =$

$40x^2 - 3x - 54 =$

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

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

Composite

$g(f(x)) =$

$g(-4x + 5) =$

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

$-20x + 25 + 4 =$

$-20x + 29 =$

(36) $f(x) = \frac{5}{x-4}$ and $g(x) = \frac{2}{7x}$

Composite

23.

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

$f(g(x)) =$

$f\left(\frac{2}{7x}\right) =$

$$\frac{5}{\left(\frac{2}{7x}\right) - 4} =$$

$$\frac{5}{\frac{2}{7x} - \frac{4}{1}\left(\frac{7x}{7x}\right)} =$$

$$\frac{5}{\frac{2}{7x} - \frac{28x}{7x}} =$$ ← LCD = 7x

$$\frac{5}{\frac{2-28x}{7x}} =$$

$$\frac{\frac{5}{1}}{\frac{2-28x}{7x}} =$$

$$\frac{5}{1} \cdot \frac{7x}{2-28x} =$$

$$\frac{35x}{2-28x} =$$

(37) $f(x)=\frac{x-10}{8}$ and $g(x)=8x+10$

(24)

Composite

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

$g(f(x)) =$

$g\left(\frac{x-10}{8}\right) =$

$8\left(\frac{x-10}{8}\right)+10 =$

$x-10+10 =$

$x =$

(38) Find the distance between the points.

$(-2, 2)$ and $(-14, 7)$

$x_1\ y_1 \qquad x_2\ y_2$

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

$d=\sqrt{((-2)-(-14))^2+((2)-(7))^2}$

$d=\sqrt{(-2+14)^2+(2-7)^2}$

$d=\sqrt{(12)^2+(-5)^2}$

$d=\sqrt{144+25}$

$d=\sqrt{169}$

$d=13$

(39.) Find the Midpoint $(-4, -8)$ and $(-9, 3)$

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

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

$$\text{Mid point} = \left(\frac{(-4)+(-9)}{2}, \frac{(-8)+(3)}{2}\right)$$

$$\text{Mid point} = \left(\frac{-4-9}{2}, \frac{-8+3}{2}\right)$$

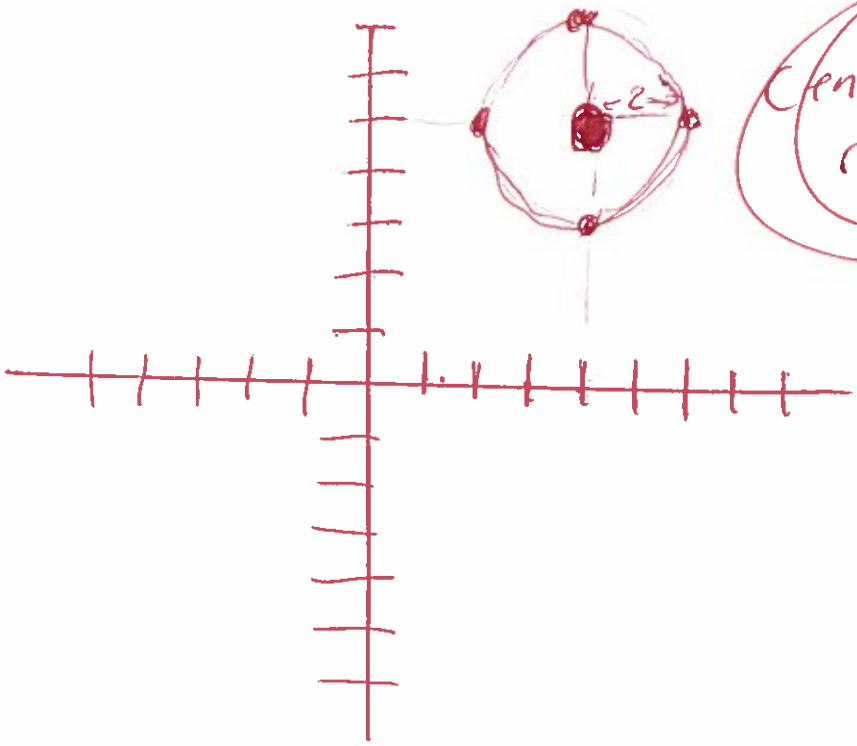
$$\text{Mid point} = \left(-\frac{13}{2}, -\frac{5}{2}\right)$$

(40.) Graph $(x-4)^2 + (y-5)^2 = 4$

opposite

Center $= (4, 5)$

Radius $= \sqrt{4} = 2$




Center $= (4, 5)$

Radius $= 2$

(41) Find Center and radius.

26

$x^2+14x+49+y^2-8y+16=16$

$(x+7)(x+7)+(y-4)(y-4)=16$

$(x+7)^2+(y-4)^2=16$

Center $=(-7, 4)$ Radius $=\sqrt{16}=4$

(42) graph $f(x)=-x^2-4x+5$

$a=-1,\ b=-4,\ c=5$

OR use graphing calculator

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

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

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

Vertex $=(-2, f(-2))$

Vertex $=(-2, -(-2)^2-4(-2)+5)$

Vertex $=(-2, -(-2)(-2)-4(-2)+5)$

Vertex $=(-2, -4+8+5)$

Vertex $=(-2, 9)$

y-intercept

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

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

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

$f(0)=5$ $(0, 5)$ y-intercept

x-intercept

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

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

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

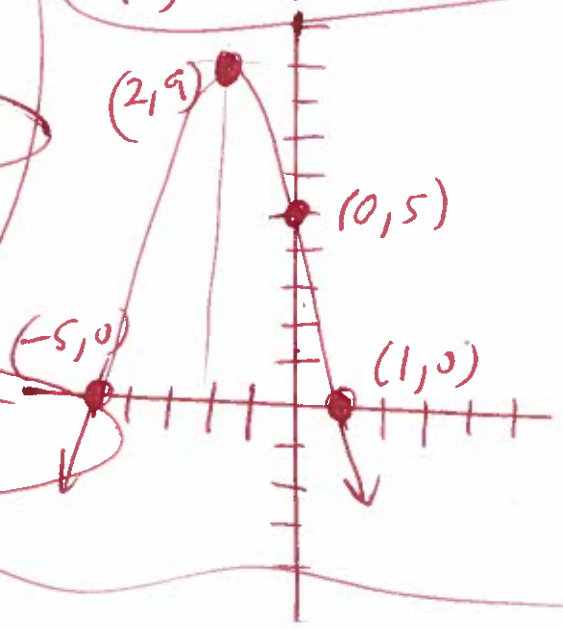
$(x-1)(x+5)=0$

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

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

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

x-intercepts $(1, 0)$ OR $(-5, 0)$



(43.) graph

Or use a graphing Calculator (27)

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

$a=1,\ b=-2,\ c=-8$

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 $= (1,\ (1)^2 - 2(1) - 8)$

Vertex $= (1,\ (1)(1) - 2(1) - 8)$

Vertex $= (1,\ 1 - 2 - 8)$

Vertex $= (1,\ -9)$

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

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

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

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

$f(0) = -8$ y-intercept

x-intercept

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

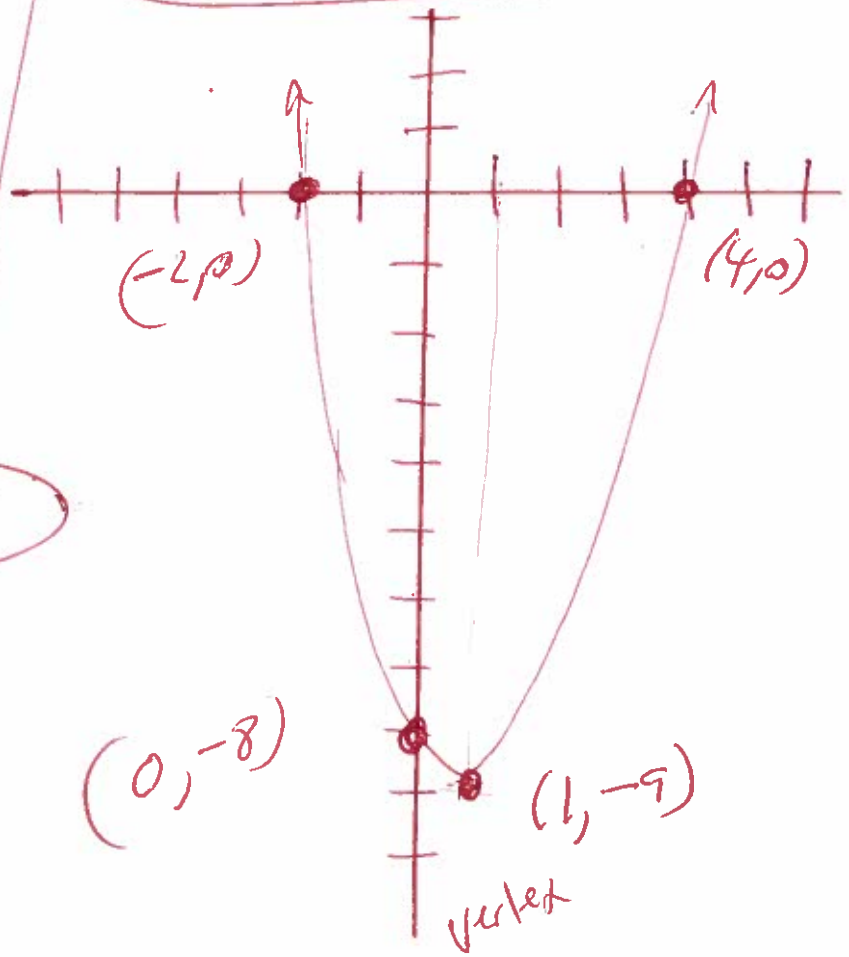
$(x+2)(x-4) = 0$

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

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

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

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



(44.) Find (max) (Vertex)

$P(x) = -4x^2 + 2400x - 350$

$a = -4,\ b = 2400,\ c = -350$

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

$\text{Vertex} = \left(\frac{-(2400)}{2(-4)}, f\left(\frac{-(2400)}{2(-4)}\right)\right)$

$\text{Vertex} = \left(\frac{-2400}{-8}, f\left(\frac{-2400}{-8}\right)\right)$

$\text{Vertex} = (300, f(300))$

$\text{Vertex} = (300, -4(300)^2 + 2400(300) - 350)$

$\text{Vertex} = (300, -4(300)(300) + 2400(300) - 350)$

$\text{Vertex} = (300, -4(90000) + 2400(300) - 350)$

$\text{Vertex} = (300, 360000 + 720000 - 350)$

$\text{Vertex} = (300, \$1079650)$

max at $x = 300$

45: Find Max (Vertex)

$f(x) = -16x^2 + 128x$

$a = -16,\ b = 128,\ c = 0$

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

$\text{Vertex} = \left(\frac{-(128)}{2(-16)},\ f\left(\frac{-(128)}{2(-16)}\right)\right)$

$\text{Vertex} = \left(\frac{-128}{-32},\ f\left(\frac{-128}{-32}\right)\right)$

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

$\text{Vertex} = (4,\ -16(4)^2 + 128(4))$

$\text{Vertex} = (4,\ -16(4)(4) + 128(4))$

$\text{Vertex} = (4,\ -256 + 512)$

$\text{Vertex} = (4,\ 256)$

max

(46) Find max (vertex)

$h(t) = -16t^2 + 32t + 34$

$a = -16,\ b = 32,\ c = 34$

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

$\text{Vertex} = \left(\frac{-(32)}{2(-16)},\ f\left(\frac{-(32)}{2(-16)}\right)\right)$

$\text{Vertex} = \left(\frac{-32}{-32},\ f\left(\frac{-32}{-32}\right)\right)$

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

$\text{Vertex} = (1,\ -16(1)^2 + 32(1) + 34)$

$\text{Vertex} = (1,\ -16(1)(1) + 32(1) + 34)$

$\text{Vertex} = (1,\ -16 + 32 + 34)$

$\text{Vertex} = (1,\ 16 + 34)$

$\text{Vertex} = (1,\ 50)$

max

(47) graph (or use graphing calculator)



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

Let $x^3 + 9x^2 - x - 9 = 0$

$(x^3 + 9x^2) + (-x - 9) = 0$ Group

$x^2(x+9) - 1(x+9) = 0$ factor

$(x+9)(x^2 - 1) = 0$

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

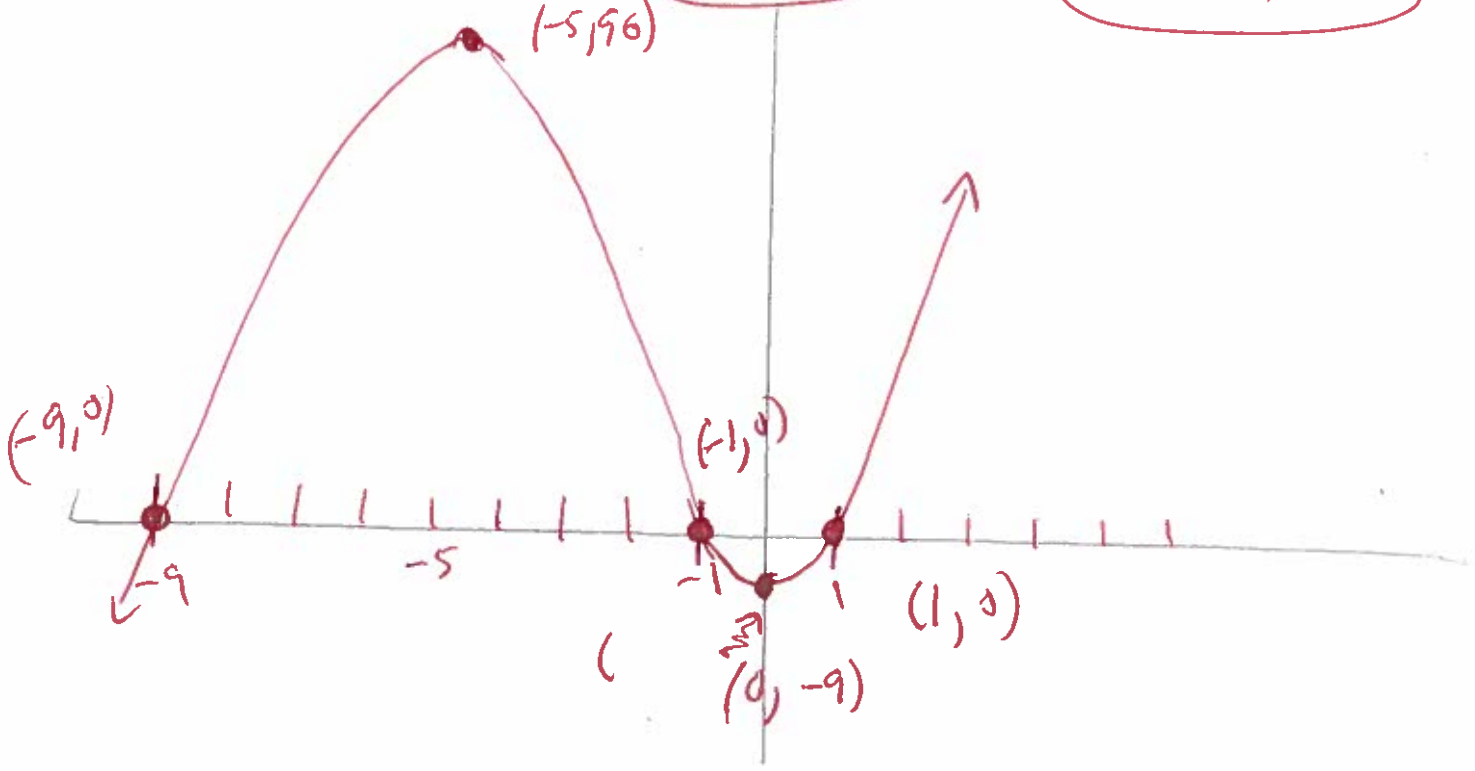
$(x+9)(x)^2 - (1)^2) = 0$

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

Let $x+9=0$ or $x+1=0$ or $x-1=0$

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

$x = -9$ or $x = -1$ or $x = 1$



(48) Find the zeros

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

set $x^3 + x^2 - 6x = 0$

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

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

6.1
2.3
possible

set $x = 0$ or $x - 2 = 0$ or $x + 3 = 0$

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

$x = 2$ or $x = -3$

(49) Find the zeros

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

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

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

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

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

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

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

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

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

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

$x = -4$ or $x = -1$ or $x = 1$

(50) Use synthetic division to Solve

$x^3 - 5x^2 - 2x + 24 = 0$

$x = 4$

(33)

| 4 | 1 | −5 | −2 | 24 |
|---|---|---|---|---|
| | | 4 | −4 | −24 |
| | 1 | −1 | −6 | 0 rem |

$x^2 - x - 6 = 0$

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

6.1
2.3

Set $x+2=0$ OR $x-3=0$

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

$x = -2$ OR $x = 3$

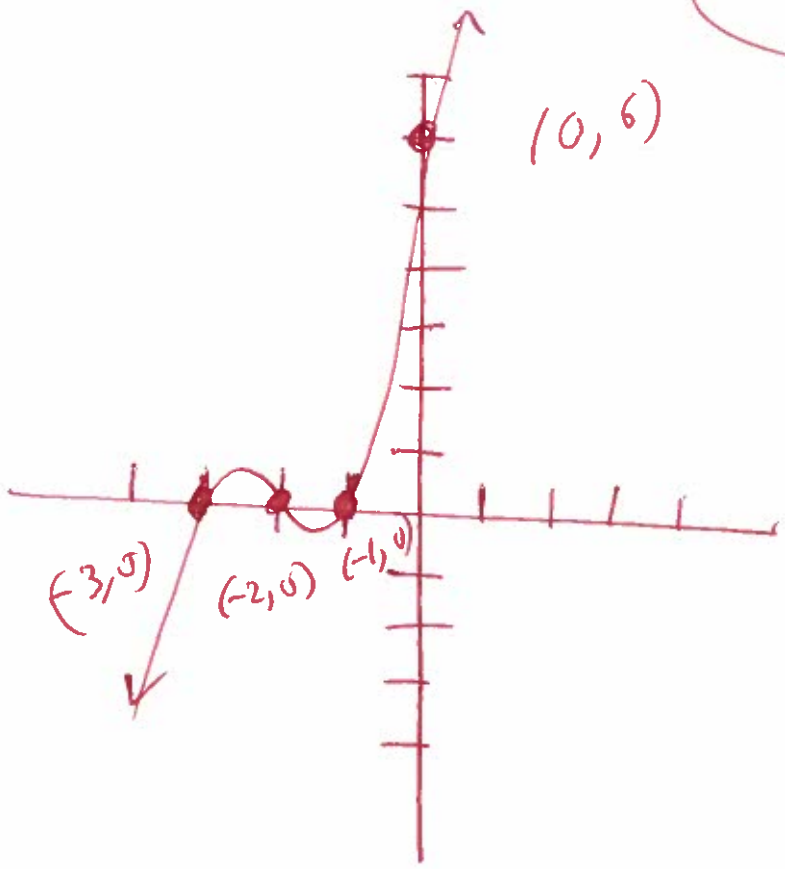
$\{4, -2, 3\}$

(57) use the graph to solve

$x^3+6x^2+11x+6=0$

3-1.

use graphing Calculator




$\{-3, -2, -1\}$

(52) Solve using synthetic division 35

$f(x) = x^3 + 2x^2 - 5x - 6$

but $x^3 + 2x^2 - 5x - 6 = 0$

6, 1
2, 3 possibly

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

$$\begin{array}{r|cccc} -1 & 1 & 2 & -5 & -6 \\ & & -1 & -1 & 6 \\ \hline & 1 & 1 & -6 & 0 \end{array}$$ rem

$x^2 + x - 6 = 0$

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

but $x - 2 = 0$ OR $x + 3 = 0$

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

$x = 2$ OR $x = -3$

$\{-1, 2, -3\}$

(53.) Solve (use synthetic division) (3)

$f(x) = x^3 + 6x^2 + 5x - 6$

(6.1, 2.3) Possible

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

Let $1x^3 + 6x^2 + 5x - 6 = 0$

$-2$ | 1 | 6 | 5 | −6
|  | −2 | −8 | 6
| 1 | 4 | −3 | 0 rem

use Quad formula

$1x^2 + 4x - 3 = 0$

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

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

$$x = \frac{-(4) \pm \sqrt{(4)^2 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 + 12}}{2}$$

$$x = \frac{-4 \pm \sqrt{28}}{2}$$

$$x = \frac{-4 \pm \sqrt{4 \cdot 7}}{2}$$

Primes: 2, 3, 5, 7, 11, 13, ...

2 | 28
2 | 14
7 | 7
1

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

$$x = -2 \pm 1\sqrt{7}$$

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

$\{-2,\ -2 - \sqrt{7},\ -2 + \sqrt{7}\}$

(54) Solve Use Synthetic division 1, 2, 13 Possible

$f(x) = x^3 - 2x^2 + 5x + 26$

$\pm 26, \pm 13, \pm 2, \pm 1$

37

So $x^3 - 2x^2 + 5x + 26 = 0$

$$\begin{array}{r|rrrr} -2 & 1 & -2 & 5 & 26 \\ & & -2 & 8 & -26 \\ \hline & 1 & -4 & 13 & 0 \end{array}$$ Rem

$x^2 - 4x + 13 = 0$

$a = 1,\ b = -4,\ c = 13$

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

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 52}}{2}$$

$$x = \frac{4 \pm \sqrt{-36}}{2}$$

$$x = \frac{4 \pm 6i}{2}$$

$$x = 2 \pm 3i$$

$\{-2,\ 2+3i,\ 2-3i\}$

55. Solve (use Synthetic division)

$1x^3+3x^2-4x-12=0$

12.1
6.2
3.4

Possible $\pm 12, \pm 6, \pm 4, \pm 3, \pm 2, \pm 1$

| | | | | |
|---|---|---|---|---|
| -2 | 1 | 3 | -4 | -12 |
| | | -2 | -2 | 12 |
| | 1 | 1 | -6 | 0 rem |

$x^2+x-6=0$

Let $(x-2)(x+3)=0$

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

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

$x=2$ or $x=-3$

$\{-2, 2, -3\}$

56. Find the vertical asymptotes

$g(x)=\frac{x}{x^2-9}$

Let $x^2-9=0$

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

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

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

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

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

57. Find the horizontal asymptote.

$$g(x) = \frac{8x^2 - 3x - 5}{3x^2 + 6x + 9}$$

39

y = horizontal asymptote = $\frac{8x^2}{3x^2}$

$y = \frac{8}{3}$

58. Find the slant asymptote.

$$f(x) = \frac{1x^2 - 7x + 5}{x + 6}$$

use synthetic division

Off

$$\begin{array}{r|rrr} -6 & 1 & -7 & 5 \\ & & -6 & 78 \\ \hline & 1 & -13 & 83 \end{array}$$ rem

$y = x - 13$ SLANT

59. Eval if $t = 8$ Round

$y = 3{,}287{,}000\,(2.7)^{0.007t}$

$y = 3{,}287{,}000\,(2.7)^{0.007(8)}$

$y = 3{,}287{,}000\,(2.7)^{0.056}$

$y = 3{,}475{,}010.1295$

$y = 3{,}480{,}000$

(60.) eval of $x=5$

$f(x) = 185e^{0.05x}$

$f(5) = 185e^{0.05(5)}$

$f(5) = 185e^{.25}$

$f(5) = 237.5447021$ ✓

OR

$f(5) = 238$ Round ✓

40

(61.) Find the domain

$f(x) = \log_3(x+1)$

form

$f(x) = \log_3(Ax+B)$

set $Ax+B > 0$

set $x+1 > 0$

$x+1-1 > 0-1$

$x > -1$


$(-1, +\infty)$

Formulas

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

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

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

41

(62) expand

$$\log_b\left(\frac{xy^2}{z^3}\right) =$$

$$\log_b(xy^2) - \log_b(z^3) =$$

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

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

Formula

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

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

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

(63.) expand

$$\log_q\left(\frac{\sqrt[5]{m}\,\sqrt[4]{n}}{k^2}\right) =$$

$$\log_q\left(\sqrt[5]{m}\,\sqrt[4]{n}\right) - \log_q(k^2) =$$

$$\log_q\left(\sqrt[5]{m}\right) + \log_q\left(\sqrt[4]{n}\right) - \log_q(k^2) =$$

$$\log_q(m^{1/5}) + \log_q(n^{1/4}) - \log_q(k^2) =$$

$$\frac{1}{5}\log_q(m) + \frac{1}{4}\log_q(n) - 2\log_q(k) =$$

formulas

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

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

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

42

(64.) expand

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

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

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

$$\log_a(x^4) + \log_a(x+5)^{1/3} - \log_a(x-2)^2 =$$

$$4\log_a(x) + \frac{1}{3}\log_a(x+5) - 2\log_a(x-2) =$$

(65.) Solve

$$3^{1+2x} = 243$$

$$3^{1+2x} = 3^5 \quad \text{rewrite}$$

$$1+2x = 5$$

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

$$2x = 4$$

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

$$x = 2$$

(66.) Solve

$$4^{5-3x} = \frac{1}{256}$$

$$4^{5-3x} = \frac{1}{4^4}$$

$$4^{5-3x} = 4^{-4}$$ rewrite

$$5-3x = -4$$

$$5-3x-5 = -4-5$$

$$-3x = -9$$

$$\frac{-3x}{-3} = \frac{-9}{-3}$$

$$x = 3$$

43.

(67.) Solve

$$4^{3x+7} = \frac{1}{16}$$

$$4^{3x+7} = \frac{1}{4^2}$$

$$4^{3x+7} = 4^{-2}$$ rewrite

$$3x+7 = -2$$

$$3x+7-7 = -2-7$$

$$3x = -9$$

$$\frac{3x}{3} = \frac{-9}{3}$$

$$x = -3$$

(68.) Solve

$7^{9x} = 4.5$

Use graphing calculator (44.)

Formula

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

$\ln(7^{9x}) = \ln(4.5)$

$9x\ln(7) = \ln(4.5)$

$\frac{9x\ln(7)}{\ln(7)} = \frac{\ln(4.5)}{\ln(7)}$

$9x = \frac{\ln(4.5)}{\ln(7)}$

$\frac{1}{9}(9x) = \frac{1}{9}\frac{\ln(4.5)}{\ln(7)}$

$x = \frac{\ln(4.5)}{9\ln(7)}$ OR

$x = (\ln(4.5)) \div (9\ln(7))$ OR

$x = .0858825423$ ✓

(69) Solve

$$2^{x+7} = 3$$

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

$$(x+7)\ln(2) = \ln(3)$$

$$\frac{(x+7)\ln(2)}{\ln(2)} = \frac{\ln(3)}{\ln(2)}$$

$$x+7 = \frac{\ln(3)}{\ln(2)}$$

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

$$x = \frac{\ln(3)}{\ln(2)} - 7$$

OR

$$x = -5.415037499$$

(70) Solve

$$e^{x+7} = 5$$

$$\ln(e^{x+7}) = \ln(5)$$

$$(x+7)\ln(e) = \ln(5)$$

$$(x+7)(1) = \ln(5)$$

$$x+7 = \ln(5)$$

$$x+7-7 = \ln(5) - 7$$

$$x = \ln(5) - 7$$

OR

$$x = -5.390562088$$

Formula: $\ln(e) = 1$

(71.) Solve

$10^x = 2.56$

$\ln(10^x) = \ln(2.56)$

$x \ln(10) = \ln(2.56)$

$\frac{x \ln(10)}{\ln(10)} = \frac{\ln(2.56)}{\ln(10)}$

$x = \frac{\ln(2.56)}{\ln(10)}$ ✓

OR

$x = .4082399653$ or Round $x = 0.41$

(72.) Solve

$5e^x = 26$

$\frac{5e^x}{5} = \frac{26}{5}$

$e^x = 5.2$

$\ln(e^x) = \ln(5.2)$

$x \ln(e) = \ln(5.2)$

$x(1) = \ln(5.2)$

$x = 1.648658626$ ✓

OR Round $x = 1.65$

Solve

(73.) $6^{4x} = 3.4$

$\ln(6^{4x}) = \ln(3.4)$

$4x \ln(6) = \ln(3.4)$

$\frac{4x \ln(6)}{\ln(6)} = \frac{\ln(3.4)}{\ln(6)}$

$4x = \frac{\ln(3.4)}{\ln(6)}$

$\frac{1}{4}(4x) = \frac{1}{4}\frac{\ln(3.4)}{\ln(6)}$

$x = \frac{\ln(3.4)}{4\ln(6)}$

$x = (\ln(3.4)) \div (4\ln(6))$

OR

$x = 0.1707505182$

OR

Round

$x \approx 0.17$

(47.)

(74) Solve

$e^{3x} = 7$

$\ln(e^{3x}) = \ln(7)$

$3x \ln(e) = \ln(7)$

$3x(1) = \ln(7)$

$3x = \ln(7)$

$\frac{3x}{3} = \frac{\ln(7)}{3}$

$x = .6486367164$ OR Round $x = 0.65$

(48)

(75) Solve

$\log_4(x-5) + \log_4(x-11) = 2$

$\log_4(x-5)(x-11) = 2$

$4^2 = (x-5)(x-11)$ rewrite

$16 = x^2 - 11x - 5x + 55$

$16 = x^2 - 16x + 55$

$0 = x^2 - 16x + 55 - 16$

$0 = x^2 - 16x + 39$

$0 = (x-3)(x-13)$

set $x-3=0$ OR $x-13=0$

$x-3+3 = 0+3$ OR $x-13+13 = 0+13$

$x = 3$ OR $x = 13$

ck

$\log_4(x-5) + \log_4(x-11) = 2$

$\log_4(3-5) + \log_4(3-11) = 2$

$\log_4(-2) + \log_4(-8) = 2$

BAD BAD

ck

$\log_4(x-5) + \log_4(x-11) = 2$

$\log_4(13-5) + \log_4(13-11) = 2$

$\log_4(8) + \log_4(2) = 2$

Good Good

$\{13\}$

(76) Solve

$\log_5(x+2) - \log_5(x) = 2$

$\log_5\left(\frac{x+2}{x}\right) = 2$

Rewrite

$5^2 = \frac{x+2}{x}$

$\frac{25}{1} = \frac{x+2}{x}$

Cross Mult

$25(x) = 1(x+2)$

$25x = x + 2$

$25x - x = x + 2 - x$

$24x = 2$

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

$x = \frac{2(1)}{2(12)}$

$x = \frac{1}{12}$

Ck

$\log_5(x+2) - \log_5(x) = 2$

$\log_5\left(\frac{1}{12}+2\right) - \log_5\left(\frac{1}{12}\right) = 2$

Good Good

$\left\{\frac{1}{12}\right\}$

(49.)

77. Solve

$\ln(6) + \ln(x-1) = 0$

$\ln(6)(x-1) = 0$

$\log_e(6)(x-1) = 0$ rewrite

$e^0 = 6(x-1)$

$1 = 6x - 6$

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

$7 = 6x$

$\frac{7}{6} = \frac{6x}{6}$

$\frac{7}{6} = x$ maybe!

CC

$\ln(6) + \ln(x-1) = 0$

$\ln(6) + \ln(\frac{7}{6}-1) = 0$

$\ln(6) + \ln(\frac{7}{6}-\frac{6}{6}) = 0$

$\ln(6) + \ln(\frac{7-6}{6}) = 0$

$\ln(6) + \ln(\frac{1}{6}) = 0$

Good Good

$\{\frac{7}{6}\}$

(50)

(78.) Solve

$\log_5(x+2) - \log_5(x-3) = 1$

$\log_5\left(\frac{x+2}{x-3}\right) = 1$

51.

$5^1 = \frac{x+2}{x-3}$

$\frac{5}{1} = \frac{x+2}{x-3}$ cross mult

$5(x-3) = 1(x+2)$

$5x - 15 = 1x + 2$

$5x - 15 + 15 = 1x + 2 + 15$

$5x = 1x + 17$

$5x - 1x = 1x + 17 - 1x$

$4x = 17$

$\frac{4x}{4} = \frac{17}{4}$

$x = \frac{17}{4}$ maybe!

ck $\log_5(x+2) - \log_5(x-3) = 1$

$\log_5\left(\frac{17}{4}+2\right) - \log_5\left(\frac{17}{4}-3\right) = 1$

$\log_5(4.25+2) - \log_5(4.25-3) = 1$

$\log_5(6.25) - \log_5(1.25) = 1$

Good — Good

$\left\{\frac{17}{4}\right\}$

79 Solve

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

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

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

$\frac{2+x}{x-3} = \frac{2}{1}$ cross mult

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

$2 + 1x = 2x - 6$

$2 + 1x - 2 = 2x - 6 - 2$

$1x = 2x - 8$

$1x - 2x = 2x - 8 - 2x$

$-1x = -8$

$\frac{-1x}{-1} = \frac{-8}{-1}$

$x = 8$ maybe!

Chk $\log(2+x) - \log(x-3) = \log(2)$

$\log(2+8) - \log(8-3) = \log(2)$

$\log(10) - \log(5) = \log(2)$

Good Good Good

{83}

(80) Solve

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

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

(53)

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

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

cross mult

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

again

$2+1x = 2x-6$

$2+1x-2 = 2x-6-2$

$1x = 2x-8$

again

$1x-2x = 2x-8-2x$

$-1x = -8$

$\frac{-1x}{-1} = \frac{-8}{-1}$

$x = 8$

mayb!

ck $\log(2+x) - \log(x-3) = \log(2)$

$\log(2+8) - \log(8-3) = \log(2)$

$\log(10) - \log(5) = \log(2)$

Good Good Good

8

Solve

(81) $\ln(x) + \ln(x-1) = \ln(56)$

$\ln(x)(x-1) = \ln(56)$

$x(x-1) = 56$

$x^2 - x = 56$

$x^2 - x - 56 = 0$

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

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

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

$x=-7$ OR $x=8$ maybe!

ck $\ln(x) + \ln(x-1) = \ln(56)$

$\ln(-7) + \ln(-7-1) = \ln(56)$

$\ln(-7) + \ln(-8) = \ln(56)$

BAD BAD

ck

$\ln(x) + \ln(x-1) = \ln(56)$

$\ln(8) + \ln(8-1) = \ln(56)$

$\ln(8) + \ln(7) = \ln(56)$

Good Good Good

$\{8\}$

54.

(82) Solve

$\ln(x) + \ln(x-1) = \ln(30)$

$\ln(x)(x-1) = \ln(30)$

$x(x-1) = 30$

$x^2 - 1x = 30$

$x^2 - x - 30 = 0$

$(x+5)(x-6) = 0$

Let $x+5=0$ OR $x-6=0$

$x+5-5 = 0-5$ OR $x-6+6 = 0+6$

$x = -5$ OR $x = 6$ maybe!

Ck

$\ln(x) + \ln(x-1) = \ln(30)$

$\ln(-5) + \ln(-5-1) = \ln(30)$

$\ln(-5) + \ln(-6) = \ln(30)$

BAD BAD

Ck $\ln(x) + \ln(x-1) = \ln(30)$

$\ln(6) + \ln(6-1) = \ln(30)$

$\ln(6) + \ln(5) = \ln(30)$

Good Good Good

{6}

(83) Solve $P=3500$, $r=9\%$, $n=4$, $t=?$ $A=7000$

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$7000 = 3500\left(1+\frac{.09}{4}\right)^{4t}$

$\frac{7000}{3500} = \frac{3500\left(1+\frac{.09}{4}\right)^{4t}}{3500}$

$2 = \left(1+\frac{.09}{4}\right)^{4t}$

$2 = (1+.0225)^{4t}$

$2 = (1.0225)^{4t}$

$\ln(2) = \ln(1.0225)^{4t}$

$\ln(2) = 4t\ln(1.0225)$

$\frac{\ln(2)}{\ln(1.0225)} = \frac{4t\ln(1.0225)}{\ln(1.0225)}$

$\frac{\ln(2)}{\ln(1.0225)} = 4t$

$\frac{1}{4}\frac{\ln(2)}{\ln(1.0225)} = \frac{1}{4}(4t)$

$\frac{\ln(2)}{4\ln(1.0225)} = t$

$7.787957428 = t$

OR Round

$7.8 \equiv t$

$(\ln(2)) \div (4\ln(1.0225)) = t$

(84) Eval if $x=7$

$y = 159e^{0.05x}$

$y = 159e^{0.05(7)}$

$y = 159e^{.35}$

$y = 159(1.419067549)$

$y = 225.6317402$

OR

$y = 226$ Round

(57)

(85) Eval if $x=30$

$A = 200e^{-0.00866x}$

$A = 200e^{-0.00866(30)}$

$A = 200e^{-.2598}$

$A = 200(.7712058115)$

$A = 154.2411623$

Round

$A = 154$

86. Solve

$112 = 200e^{-0.01155x}$

$\frac{112}{200} = \frac{200e^{-0.01155x}}{200}$

$.56 = e^{-0.01155x}$

$\ln(.56) = \ln(e^{-0.01155x})$

$\ln(.56) = -0.01155x \ln(e)$

$\ln(.56) = -0.01155x(1)$

$\ln(.56) = -0.01155x$

$\frac{\ln(.56)}{-0.01155} = \frac{-0.01155x}{-0.01155}$

$50.200073552 = x$

or Round

$50 \equiv x$

87. Half-Life form

$A = P\left(\frac{1}{2}\right)^{\frac{t}{N}}$ Eval if $P=90$, $N=710$, $t=800$

$A = 90\left(\frac{1}{2}\right)^{\frac{800}{710}}$

$A = 90\left(\frac{1}{2}\right)^{1.126760563}$

$A = 90(.457942839\ldots)$

$A = 41.21485555$

OR Round

$A \equiv 41.215$

(88.) Solve

$200 = 100e^{.019x}$

$\frac{200}{100} = \frac{100e^{.019x}}{100}$

$2 = e^{.019x}$

$\ln(2) = \ln(e^{.019x})$

$\ln(2) = .019x \ln(e)$

$\ln(2) = .019x(1)$

$\ln(2) = .019x$

$\frac{\ln(2)}{.019} = \frac{.019x}{.019}$

$36.48143056 = x$

OR (Round)

$36 \equiv x$

59

(#9) Solve (Use graphing calculator Matrix functions) (60)

$$4x+4y+z=-11$$
$$4x-3y-z=30$$
$$4x+y+3z=-2$$

2ND, Matrix, Edit, [A], enter, 3 x 4.

$$[A]=\begin{bmatrix} 4 & 4 & 1 & -11 \\ 4 & -3 & -1 & 30 \\ 4 & 1 & 3 & -2 \end{bmatrix}$$ 2ND Quit

2ND, Matrix, Math, rref,

rref([A]) enter

$$\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -5 \\ 0 & 0 & 1 & -3 \end{bmatrix}$$

$(x, y, z) = (3, -5, -3)$

(90) Solve

$x - y = 3$

$x^2 = y^2 + 39$

61.

$x - y = 3$

$x = 3 + y$ rewrite

Sub

$(3+y)^2 = y^2 + 39$

$(3+y)(3+y) = y^2 + 39$

$9 + 3y + 3y + y^2 = y^2 + 39$

$9 + 6y + y^2 = y^2 + 39$

$y^2 + 6y + 9 = y^2 + 39$

$y^2 + 6y + 9 - y^2 - 39 = 0$

$6y - 30 = 0$

$6y - 30 + 30 = 0 + 30$

$6y = 30$

$\frac{6y}{6} = \frac{30}{6}$

$y = 5$

$x = 3 + y$

$x = 3 + (5)$

$x = 3 + 5$

$x = 8$

$(x, y) = (8, 5)$

(91.) Solve (use graphing calculator)

$x+y+z=-5$
$x-y+2z=-6$
$3x+y+z=-1$

62.

2ND, Matrix, Edit, [A], Enter, 3 X 4.

$$[A]=\begin{bmatrix}1 & 1 & 1 & -5\\ 1 & -1 & 2 & -6\\ 3 & 1 & 1 & -1\end{bmatrix}$$

2ND Quit

2ND, Matrix, Math, rref,

rref ([A]) enter

$$\begin{bmatrix}1 & 0 & 0 & 2\\ 0 & 1 & 0 & -2\\ 0 & 0 & 1 & -5\end{bmatrix}$$

$(x, y, z) = (2, -2, -5)$

(92.) Solve

$$A=\begin{bmatrix}-1 & 3\\ 5 & 6\end{bmatrix}, \quad B=\begin{bmatrix}0 & -2 & 4\\ 1 & -3 & 2\end{bmatrix}$$

63.

2nd D, Matrix, Edit, [A], Enter, 2x2.

$$[A]=\begin{bmatrix}-1 & 3\\ 5 & 6\end{bmatrix}$$ 2nd Quit

2nd, Matrix, Edit, [B], Enter 2x3.

$$[B]=\begin{bmatrix}0 & -2 & 4\\ 1 & -3 & 2\end{bmatrix}$$ 2nd Quit

2nd Matrix 2nd Matrix

$[A] \cdot [B] =$ Enter

$$\begin{bmatrix}3 & -7 & 2\\ 6 & -28 & 32\end{bmatrix}=$$

(93) Eval the determinant

$$\begin{vmatrix} -3 & -5 & -3 \\ 4 & 0 & -3 \\ 5 & 0 & -5 \end{vmatrix}$$

64.

2nd, matrix, Edit, [D], enter, 3 x 3.

$$[D] = \begin{bmatrix} -3 & -5 & -3 \\ 4 & 0 & -3 \\ 5 & 0 & -5 \end{bmatrix}$$

2nd, matrix, math, det, enter

det([D]) =

−25 =

(94) Use Cramers rule

$2x+5y-z=48$

$x-5y+4z=-21$

$5x+y+z=34$

Use graphing Calculator (65)

$D = \begin{bmatrix} 2 & 5 & -1 \\ 1 & -5 & 4 \\ 5 & 1 & 1 \end{bmatrix}$ $\det[D] = 51$ determinant

$D_x = \begin{bmatrix} 48 & 5 & -1 \\ -21 & -5 & 4 \\ 34 & 1 & 1 \end{bmatrix}$ $\det[D_x] = 204$ determinant

$D_y = \begin{bmatrix} 2 & 48 & -1 \\ 1 & -21 & 4 \\ 5 & 34 & 1 \end{bmatrix}$ $\det[D_y] = 459$ determinant

$D_z = \begin{bmatrix} 2 & 5 & 48 \\ 1 & -5 & -21 \\ 5 & 1 & 34 \end{bmatrix}$ $\det[D_z] = 255$ determinant

$x = \frac{\det[D_x]}{\det[D]} = \frac{204}{51} = 4$

$y = \frac{\det[D_y]}{\det[D]} = \frac{459}{51} = 9$

$z = \frac{\det[D_z]}{\det[D]} = \frac{255}{51} = 5$

$(x, y, z) =$

$(4, 9, 5) =$

(95.) Evaluate $\sum_{x=3}^{6} (6x)$

Use graphing Calculator

66

Math, summation $\Sigma$,

$\sum_{x=3}^{6} (6x) = 108$

(96.) Evaluate $\sum_{x=3}^{6} (3x-4)$

Use graphing Calculator

Math, summation $\Sigma$

$\sum_{x=3}^{6} (3x-4) = 38$

(97.) Evaluate $\sum_{x=1}^{4} (2^x)$

Use graphing Calculator

Math, summation $\Sigma$

$\sum_{x=1}^{4} (2 \wedge x) = 30$

98. Eval $\sum_{X=1}^{47} (4X-5)$

Use a graphing Calculator

67

Math, Summation $\Sigma$

$\sum_{X=1}^{47} (4X-5) = 4277$

99. Eval $\sum_{X=1}^{5} (4 * 4^X)$

Use a graphing Calculator

Math, Summation $\Sigma$.

$\sum_{X=1}^{5} (4 * 4 \wedge X) = 5456$

(100) Use the Binomial Theorem (Use a graphing calculator)

$(3x+2)^3 =$

$${}_3C_0(3x)^3(2)^0 + {}_3C_1(3x)^2(2)^1 + {}_3C_2(3x)^1(2)^2 + {}_3C_3(3x)^0(2)^3 =$$

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

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

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

(101) Use the Binomial Theorem (use a graphing calculator)

$(2x+3)^4$

$${}_4C_0(2x)^4(3)^0 + {}_4C_1(2x)^3(3)^1 + {}_4C_2(2x)^2(3)^2 + {}_4C_3(2x)^1(3)^3 + {}_4C_4(2x)^0(3)^4 =$$

$$(1)(2^4x^4)(1)+(4)(2^3x^3)(3)+(6)(2^2x^2)(9)+(4)(2x)(27)+(1)(1)(81) =$$

$$(1)(16x^4)(1)+(4)(8x^3)(3)+(6)(4x^2)(9)+(4)(2x)(27)+(1)(1)(81) =$$

$$16x^4 + 96x^3 + 216x^2 + 216x + 81 =$$

(102) Write the first three terms (use binomial theorem) (use a graphing calculator)

$(x+2)^{17}$

$${}_{17}C_0(x)^{17}(2)^0 + {}_{17}C_1(x)^{16}(2)^1 + {}_{17}C_2(x)^{15}(2)^2 =$$

$$(1)(x^{17})(1) + (17)(x^{16})(2) + (136)(x^{15})(4) =$$

$$x^{17} + 34x^{16} + 544x^{15} =$$