M1314449

1. $12x^2+31x+20=0$ M1314V4
2. $x^2-14x+53=0$ M1314V8
3. $\sqrt{22x+11}=x+6$ M1314V9
4. $x-\sqrt{3x-2}=4$ M1314V10
5. $f(x)=x^3-3x^2+1$ (max/min) M1314V15
6. $f(x)=\begin{cases} x+1 & \text{if } x<1 \\ -5 & \text{if } x\geq 1 \end{cases}$ M1314V17
7. $f(x)=x^2+9x-2$, $\frac{f(x+h)-f(x)}{h}$ M1314V18
8. $h(x)=|x-5|-5$ graph M1314V21
9. $f(x)=\sqrt{24-x}$ domain M1314V23
10. $f(x)=9x-2$, $g(x)=4x-7$, $f-g$ M1314V25
11. $f(x)=9-2x$, $g(x)=-4x+2$, $f+g$, M1314V27
12. $f(x)=3x-6$, $g(x)=5x-7$, fg, M1314V28
13. $f(x)=3x+14$, $g(x)=2x-1$, $(f\circ g)(x)$ M1314V30
14. $f(x)=4x^2+6x+5$, $g(x)=6x-7$, $(g\circ f)(x)$ M1314V31
15. $(-1,-3)$ and $(-5,0)$ distance, M1314V33
16. $(5,1)$ and $(3,0)$ midpoint, M1314V35
17. $x^2+y^2-8x-12y+43=0$ graph M1314V36
18. $f(x)=2(x+6)^2+1$, graph, M1314V37
19. $f(x)=-x^2-4x+5$, graph M1314V38
20. $h(x)=-16x^2+160x$, find Max M1314V39

1

M1314 Videos

M1314449

11/1/16

(21.) $x^3+5x^2-x-5=0$ M13/4V42

(22) $f(x)=x^3-2x^2-5x+6$ graph M13/4V43

(23.) $x^3-2x^2-5x+6=0$, $x=3$ sol, M13/4V45

(24.) $x^3+8x^2+25x+26=0$ M13/4V47

(25.) $x^3+3x^2-4x-12=0$ M13/4V48

(26.) $x^3+3x^2-8x+10=0$ M13/4V49

(27.) $\frac{x-8|}{x^2-15x+56}$ vertical asymptote M13/4V54

(28.) $f(x)=\frac{25x}{5x^2+1}$ horizontal asymptote M13/4V55

(29.) $g(x)=\frac{4x^2-7x-5}{7x^2-3x+7}$ horizontal asymptote M13/4V56

(30) $f(x)=\frac{x^2+3x-8}{x-4}$ slant asymptote M13/4V57

(31.) $f(x)=\ln(6-x)$ domain M13/4V63

(32.) $\log_a\left(\frac{x^4\sqrt[3]{x+5}}{(x-2)^2}\right)$ expand M13/4V66

(33.) $4^{x+10}=8^{x-2}$ M13/4V70

(34.) $9^{5x}=3.3$ M13/4V71

(35.) $7e^x=10$ M13/4V72

(36.) $4^{x+6}=7$ M13/4V73

37. $\log_4(x-4) + \log_4(x-10) = 2$ M13/4V76

38. $\log_6(x^2-5x) = 1$ M13/4V77

39. $\log_5(x-1) - \log_5(x-3) = 1$ M13/4V78

40. $\log(5+x) - \log(x-3) = \log(5)$ M13/4V79

41. $\log(x) + \log(x-1) = \log(12)$ M13/4V80

42. $5000 = 2500\left(1+\frac{.08}{4}\right)^{4t}$ M13/4V81

43. $504 = 800e^{-0.0077x}$ M13/4V83

44. $200 = 100e^{.025x}$ M13/4V84

45. $38 = 100\left(\frac{1}{2}\right)^{\frac{t}{5600}}$ M13/4V87

46. $x+y+z=-6$
$x-y+3z=2$
$3x+y+z=-14$ M13/4V89

47. $\sum_{x=3}^{5}(x^2+2)$ M13/4V98

48. $(2x+3)^3$ expand M13/4V99

49. $(x+2)^{15}$ First three terms M13/4V100

1. Solve by factoring

$12x^2 + 31x + 20 = 0$

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

12.1
6.2
3.4

20.1
10.2
4.5
Possible

4

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

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

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

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

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

(2) Solve (Use Quadratic formula)

$$x^2 - 14x + 53 = 0$$

(5)

$$1x^2 - 14x + 53 = 0$$

$a = 1, \quad b = -14, \quad c = 53$

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

$$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(1)(53)}}{2(1)}$$

$$x = \frac{14 \pm \sqrt{196 - 212}}{2}$$

$$x = \frac{14 \pm \sqrt{-16}}{2}$$

$$x = \frac{14 \pm 4i}{2}$$

$$x = 7 \pm 2i$$

$x = 7 + 2i$ or $x = 7 - 2i$

3. $\sqrt{22x+11} = x+6$

$\left(\sqrt{22x+11}\right)^2 = (x+6)^2$

$22x+11 = (x+6)(x+6)$

$22x+11 = x^2+6x+6x+36$

$22x+11 = x^2+12x+36$

$0 = x^2+12x+36-22x-11$

$0 = x^2-10x+25$

25.1
5.5
possible

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

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

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

$x=5$ OR $x=5$

good

Ck

$\sqrt{22x+11} = x+6$

$\sqrt{22(5)+11} = (5)+6$

$\sqrt{110+11} = 5+6$

$\sqrt{121} = 11$

$11 = 11$ yes ✓

$\{5\}$

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

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

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

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

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

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

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

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

$3x - 2 = x^2 - 8x + 16$ (rewrite)

$0 = x^2 - 8x + 16 - 3x + 2$ (rewrite)

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

18 1
9 2 Possibly
3 6

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

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

{9}

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

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

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

$2 - \sqrt{4} = 4$

$2 - 2 = 4$

$0 \neq 4$ BAD

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

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

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

$9 - \sqrt{25} = 4$

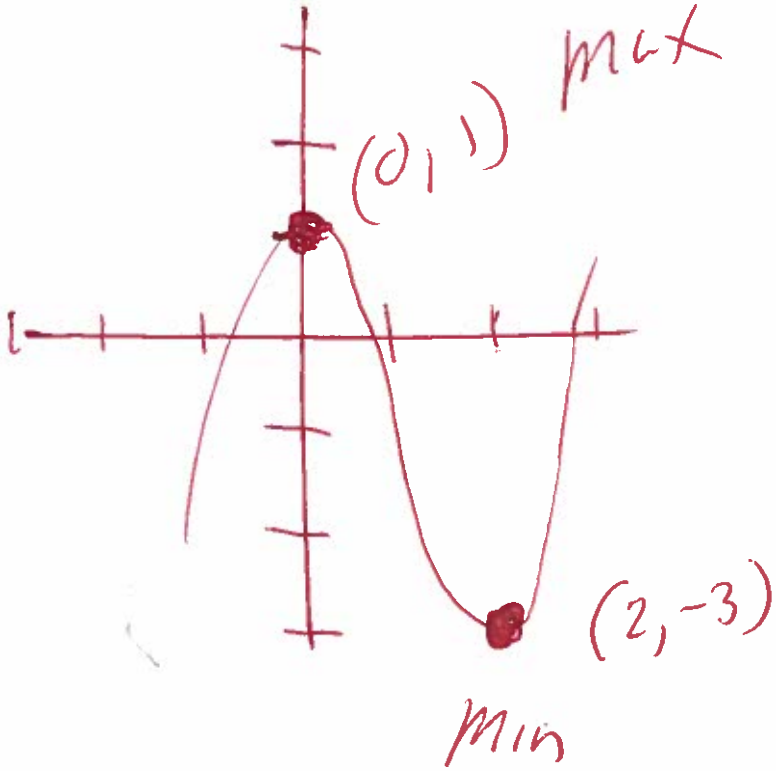
$9 - 5 = 4$

$4 = 4$ YES ✓

(5.) $f(x) = x^3 - 3x^2 + 1$ find max, min

use graphing calculator

$Y_1 = X\wedge 3 \text{ ——— } 3X\wedge 2 + 1$



Local maximum (0,1)

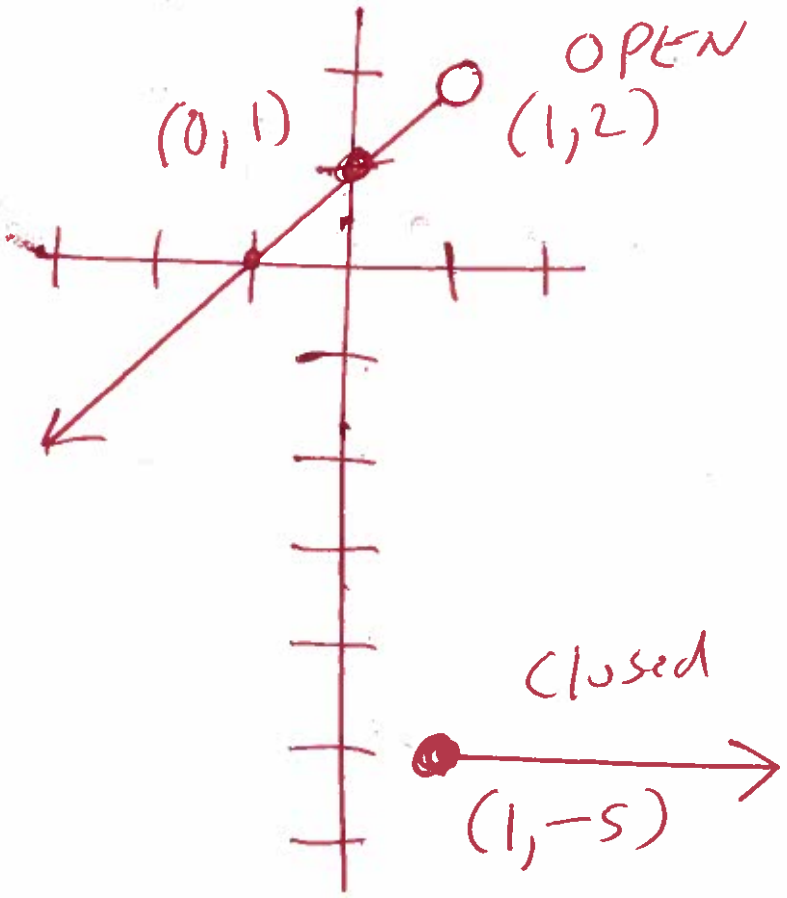
Local minimum (2,-3)

⑥ $f(x) = \begin{cases} x+1 & \text{if } x<1 \\ -5 & \text{if } x \geq 1 \end{cases}$ graph

$Y_1 = X+1 \div (X<1)$ Open

$Y_2 = -5 \div (X \geq 1)$ Closed

use graphing Calculator



(7) $f(x) = x^2 + 9x - 2$ find $\frac{f(x+h) - f(x)}{h}$

(10)

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

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

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

$$\frac{x^2 + xh + xh + h^2 + 9x + 9h - 2 - x^2 - 9x + 2}{h} =$$

$$\frac{xh + xh + h^2 + 9h}{h} =$$

$$\frac{2xh + h^2 + 9h}{h} =$$

$$2x + h + 9 =$$

(8.) $h(x) = |x-5|-5$ graph

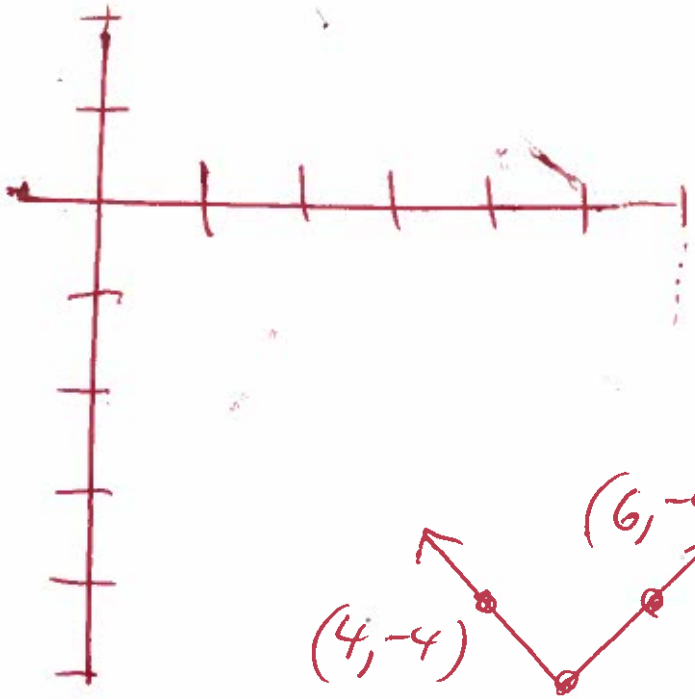
x	h(x)
4	-4
5	-5
6	-4

(11)

$h(4) = |4-5|-5$
$h(4) = |-1|-5$
$h(4) = 1-5$
$h(4) = -4$

$h(5) = |5-5|-5$
$h(5) = |0|-5$
$h(5) = 0-5$
$h(5) = -5$

$h(6) = |6-5|-5$
$h(6) = |1|-5$
$h(6) = 1-5$
$h(6) = -4$



use
math, Num, abs

OR

$y_1 = abs(X-5)-5$

use graphing Calculator

(9) $f(x) = \sqrt{24 - x}$ find Domain

(12)

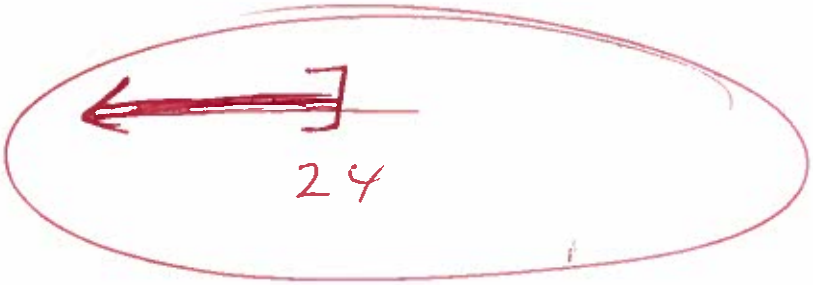
Let $24 - x \geq 0$

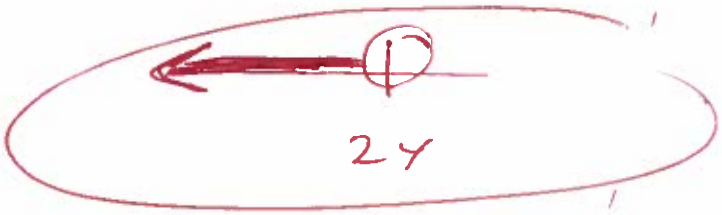
$24 - x - 24 \geq 0 - 24$

$-x \geq -24$

$\frac{-x}{-1} \leq \frac{-24}{-1}$

$x \leq 24$





$(-\infty, 24]$

(10.) $f(x) = 9x - 2$, $g(x) = 4x - 7$

13.

Find $f - g =$

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

$(9x - 2) - (4x - 7) =$

$9x - 2 - 4x + 7 =$

$5x + 5 =$

(11.) $f(x) = 9 - 2x$, $g(x) = -4x + 2$

find $f + g =$

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

$(9 - 2x) + (-4x + 2) =$

$9 - 2x - 4x + 2 =$

$-6x + 11 =$

(14.)

(12.) $f(x) = 3x - 6$, $g(x) = 5x - 7$

Find $f \cdot g =$

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

$(3x - 6)(5x - 7) =$

$15x^2 - 21x - 30x + 42 =$

$15x^2 - 51x + 42 =$

13. $f(x) = 3x + 14$, $g(x) = 2x - 1$

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

$f(g(x)) =$

$f(2x-1) =$

$3(2x-1) + 14 =$

$6x - 3 + 14 =$

$6x + 11 =$

(14) $f(x) = 4x^2 + 6x + 5$, $g(x) = 6x - 7$

(17)

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

$g(f(x)) =$

$g(4x^2 + 6x + 5) =$

$6(4x^2 + 6x + 5) - 7 =$

$24x^2 + 36x + 30 - 7 =$

$24x^2 + 36x + 23 =$

(15.) for $(-1,-3)$ and $(-5,0)$
find distance x_1 y_1 x_2 y_2

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

$$d = \sqrt{((-1) - (-5))^2 + ((-3) - (0))^2}$$

$$d = \sqrt{(-1+5)^2 + (-3-0)^2}$$

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

$$d = \sqrt{16 + 9}$$

$$d = \sqrt{25}$$

$$d = 5$$

(16.) For (5, 1) and (3, 0)
$x_1\ y_1$ $x_2\ y_2$
find midpoint

19.

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

$$\text{midpoint} = \left(\frac{(5)+(3)}{2}, \frac{(1)+(0)}{2}\right)$$

$$\text{midpoint} = \left(\frac{5+3}{2}, \frac{1+0}{2}\right)$$

$$\text{midpoint} = \left(\frac{8}{2}, \frac{1}{2}\right)$$

$$\text{midpoint} = \left(4, \frac{1}{2}\right)$$

(17) $x^2+y^2-8x-12y+43=0$ graph

(20)

$x^2-8x+y^2-12y=-43$

$x^2-8x+\left(\frac{1}{2}(-8)\right)^2+y^2-12y+\left(\frac{1}{2}(-12)\right)^2=-43+\left(\frac{1}{2}(-8)\right)^2+\left(\frac{1}{2}(-12)\right)^2$

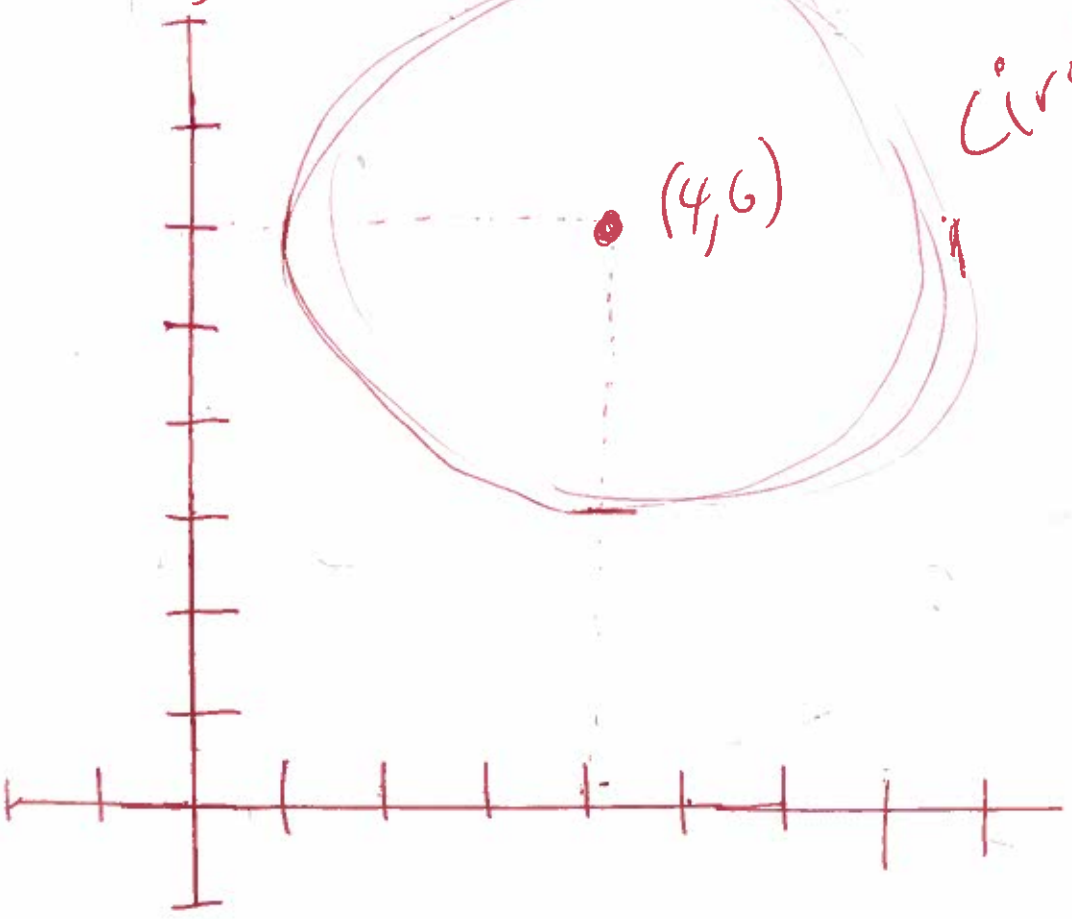
$x^2-8x+(-4)^2+y^2-12y+(-6)^2=-43+(-4)^2+(-6)^2$

$x^2-8x+16+y^2-12y+36=-43+16+36$

$(x-4)(x-4)+(y-6)(y-6)=9$

$(x-4)^2+(y-6)^2=9$

CENTER $=(4,6)$ Radius $=\sqrt{9}=3$



(18) $f(x) = 2(x+6)^2 + 1$ graph

x	y $f(x)$
-7	3
-6	1
-5	3

(21)

$f(-7) = 2(-7+6)^2 + 1$

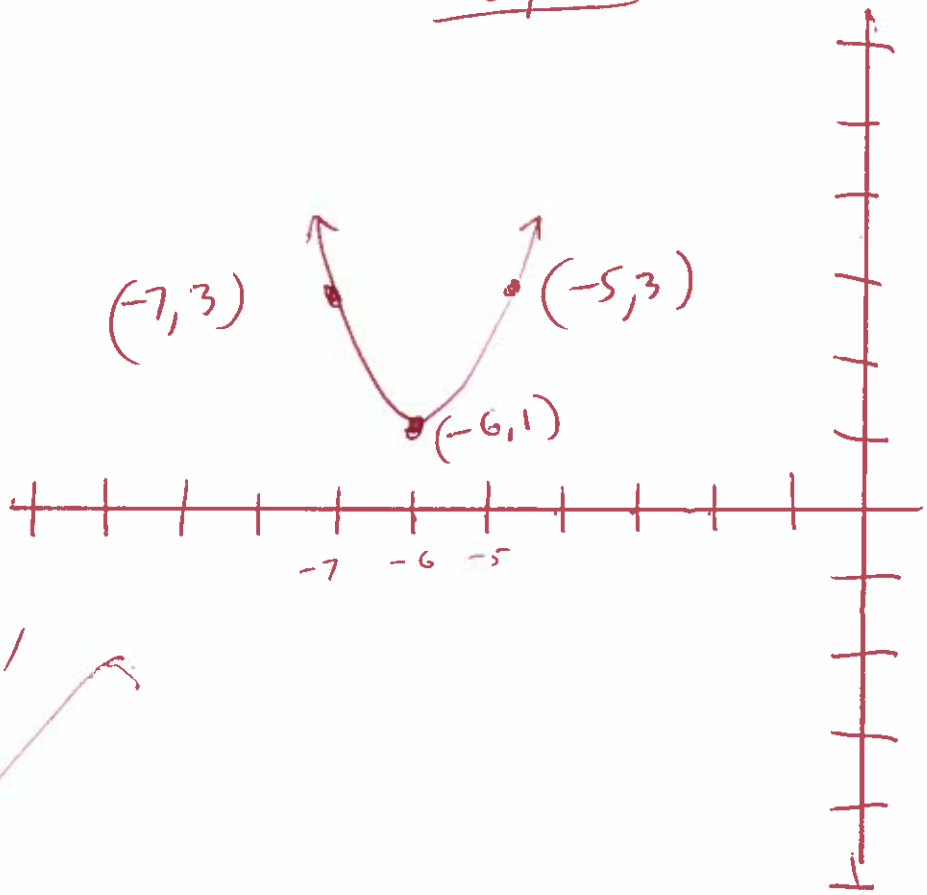
$f(-7) = 2(-1)^2 + 1$

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

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

$f(-7) = 2 + 1$

$f(-7) = 3$



$f(-6) = 2(-6+6)^2 + 1$

$f(-6) = 2(0)^2 + 1$

$f(-6) = 2(0)(0) + 1$

$f(-6) = 2(0) + 1$

$f(-6) = 0 + 1$

$f(-6) = 1$

$f(-5) = 2(-5+6)^2 + 1$

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

$f(-5) = 2(1)(1) + 1$

$f(-5) = 2(1) + 1$

$f(-5) = 2 + 1$

$f(-5) = 3$

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

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

Vertex

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-intercepts

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

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

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

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

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

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

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

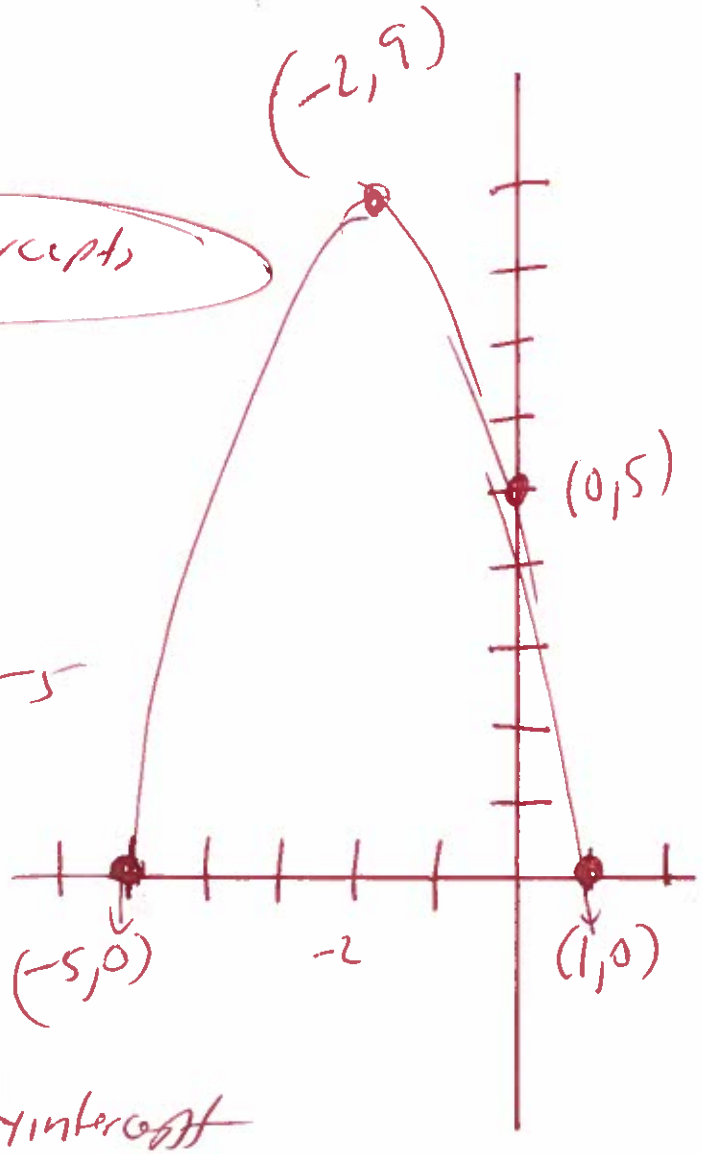
$(1, 0)$ OR $(-5, 0)$

Set $x = 0$ $\quad y = -(0)^2 - 4(0) + 5$

$y = -(0)(0) - 4(0) + 5$

$y = 0 - 0 + 5$

$y = 5$ $\quad (0, 5)$ y-intercept



(20.) $h(x) = -16x^2 + 160x$ find max

$a = -16 \quad b = 160, \quad c = 0$

(23.)

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

$\text{Vertex} = \left(-\frac{(160)}{2(-16)}, \; f\left(-\frac{(160)}{2(-16)}\right)\right)$

$\text{Vertex} = \left(\frac{-160}{-32}, \; f\left(\frac{-160}{-32}\right)\right)$

$\text{Vertex} = (5, \; f(5))$

$\text{Vertex} = (5, \; -16(5)^2 + 160(5))$

$\text{Vertex} = (5, \; -16(5)(5) + 160(5))$

$\text{Vertex} = (5, \; -16(25) + 160(5))$

$\text{Vertex} = (5, \; -400 + 800)$

$\text{Vertex} = (5, \; 400)$

$\text{Max} = 400$

(21.) $x^3+5x^2-x-5=0$

possible $\pm 5, \pm 1$ (24)

use synthetic division

$$\begin{array}{r|cccc} -1 & 1 & 5 & -1 & -5 \\ & & -1 & -4 & 5 \\ \hline & 1 & 4 & -5 & 0 \end{array}$$ rem

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

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

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

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

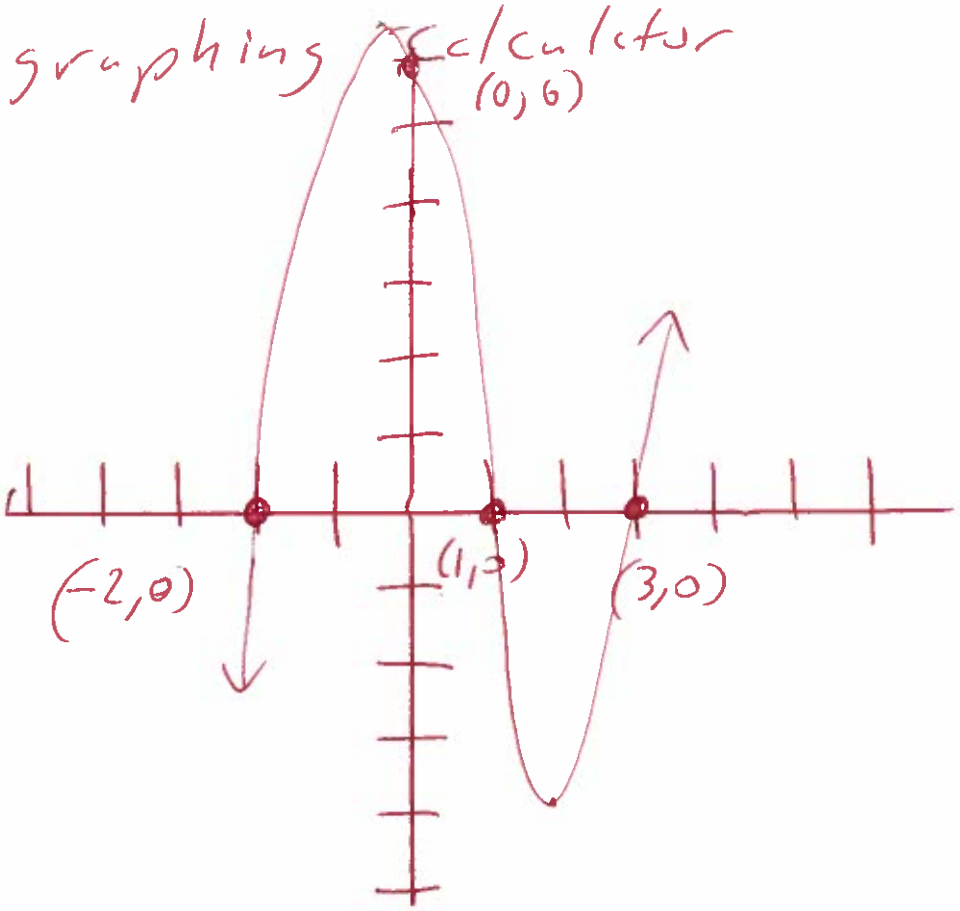
$x=1$ OR $x=-5$

$\{-1, 1, -5\}$

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

(25)

Use graphing calculator



(23) $x^3 - 2x^2 - 5x + 6 = 0$

(26)

Given $x = 3$ is a solution

use synthetic division

3	1	−2	−5	6
		3	3	−6
	1	1	−2	0 rem

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

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

$x - 1 = 0$ OR $x + 2 = 0$

$x - 1 + 1 = 0 + 1$ OR $x + 2 - 2 = 0 - 2$

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

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

(24) $1x^3 + 8x^2 + 25x + 26 = 0$

(27) $\pm 26, \pm 13, \pm 2, \pm 1$ possible

$$\begin{array}{r|cccc} -2 & 1 & 8 & 25 & 26 \\ & & -2 & -12 & -26 \\ \hline & 1 & 6 & 13 & 0 \end{array}$$ rem

$1x^2 + 6x + 13 = 0$

$a=1,\ b=6,\ c=13$

Use Quadratic formula

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

$$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(1)(13)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{36 - 52}}{2}$$

$$x = \frac{-6 \pm \sqrt{-16}}{2}$$

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

$x = -3 \pm 2i$

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

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

(25.) $1x^3+3x^2-4x-12=0$

(28.) $\pm 12, \pm 6, \pm 4, \pm 3, \pm 2, \pm 1$ possible

Synthetic division

$$\begin{array}{r|cccc} -2 & 1 & 3 & -4 & -12 \\ & & -2 & -2 & 12 \\ \hline & 1 & 1 & -6 & 0 \text{ rem} \end{array}$$

$x^2+x-6=0$

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

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

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

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

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

(26) $x^3+3x^2-8x+10=0$

(29)

± 10) $\pm 5, \pm 2, \pm 1$ Possible

Synthetic division

$$\begin{array}{r|rrrr} -5 & 1 & 3 & -8 & 10 \\ & & -5 & 10 & -10 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$ rem

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

use Quadratic formula

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

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

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

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

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

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

$x=1\pm 1i$

$x=1-i$, or $x=1+i$

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

27. $\frac{x-8|}{x^2-15x+56}$ find vertical asymptote

30.

Set $x^2-15x+56=0$

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

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

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

$x=7$ OR $x=8$

Possible
56.1
28.2
14.4
7.8

(28.) $f(x) = \frac{25x}{5x^2+1}$ find horizontal asymptote

(31.)

$Y = HA = \frac{25x}{5x^2}$

$HA = \frac{(5)(5)x}{5(x)(x)}$

$HA = \frac{5}{x}$

$\lim_{x \to \infty} \frac{5}{x} = 0$

$Y = 0$

(29) $g(x) = \frac{4x^2 - 7x - 5}{7x^2 - 3x + 7}$ find horizontal asymptote

32.

$Y = HA = \frac{4x^2}{7x^2}$

$Y = HA = \frac{4 \cdot x \cdot x}{7 \cdot x \cdot x}$

$Y = \frac{4}{7}$

(30) $f(x) = \dfrac{x^2 + 3x - 8}{x - 4}$ Find slant asymptote

(33.)

opp

Use Synthetic division

$$\begin{array}{r|rrr} 4 & 1 & 3 & -8 \\ & & 4 & 28 \\ \hline & 1 & 7 & 20 \end{array}$$ rem

$y = x + 7$

(31) $f(x) = \ln(6-x)$ find domain

34

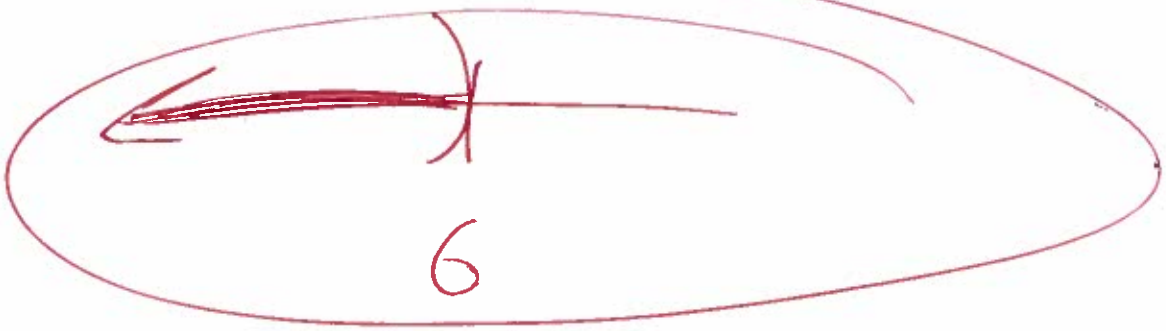
Let $6-x > 0$

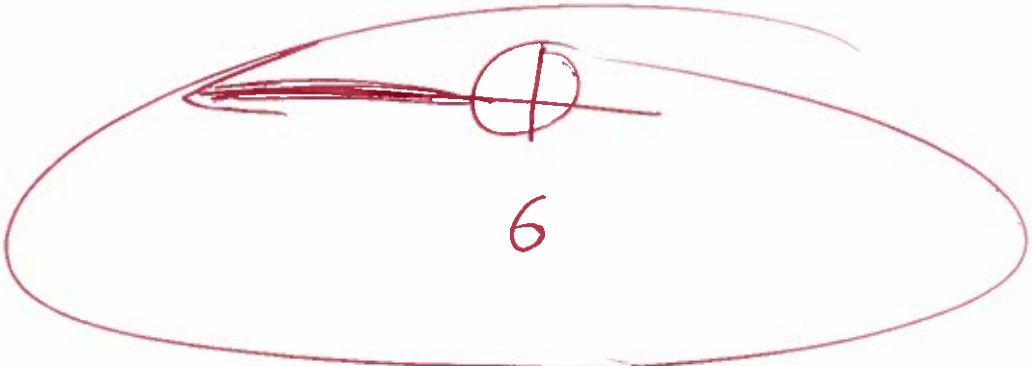
$6-x-6 > 0-6$

$-x > -6$

$\frac{-x}{-1} < \frac{-6}{-1}$ (turn alligator around)

$x < 6$





$(-\infty, 6)$

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

35.

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

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

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

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

(33.) $4^{x+10} = 8^{x-2}$

(36.)

$(2^2)^{x+10} = (2^3)^{x-2}$

$2^{2x+20} = 2^{3x-6}$

$2x+20 = 3x-6$

$2x+20-20 = 3x-6-20$

$2x = 3x-26$

$2x-3x = 3x-26-3x$

$-1x = -26$

$\frac{-1x}{-1} = \frac{-26}{-1}$

$x = 26$

(34) $9^{5x} = 3.3$

(37)

$\ln(9^{5x}) = \ln(3.3)$

$5x \ln(9) = \ln(3.3)$

$$\frac{5x \ln(9)}{(5 \ln(9))} = \frac{\ln(3.3)}{(5 \ln(9))}$$

$$x = \frac{\ln(3.3)}{(5 \ln(9))}$$

OR

Use a graphing calculator

$x = .108675506 4$

(35) $7e^x = 10$

$$\frac{7e^x}{7} = \frac{10}{7}$$

$$e^x = \frac{10}{7}$$

$$\ln(e^x) = \ln\left(\frac{10}{7}\right)$$

$$x\ln(e) = \ln\left(\frac{10}{7}\right)$$

$$x(1) = \ln\left(\frac{10}{7}\right)$$

$$x = \ln\left(\frac{10}{7}\right)$$

OR

use a graphing calculator

$x = .3566749439$

(36) $4^{x+6} = 7$

(39)

$\ln(4^{x+6}) = \ln(7)$

$(x+6)\ln(4) = \ln(7)$

$\frac{(x+6)\ln(4)}{\ln(4)} = \frac{\ln(7)}{\ln(4)}$

$(x+6) = \frac{\ln(7)}{\ln(4)}$

$x+6 = \frac{\ln(7)}{\ln(4)}$

$x+6-6 = \frac{\ln(7)}{\ln(4)} - 6$

$x = \frac{\ln(7)}{\ln(4)} - 6$

OR

Use a graphing calculator

$x = -4.596322539$

(37) $\log_4(x-4) + \log_4(x-10) = 2$

$\log_4[(x-4)(x-10)] = 2$

$4^2 = (x-4)(x-10)$

$16 = x^2 - 10x - 4x + 40$

$16 = x^2 - 14x + 40$

$16 - 16 = x^2 - 14x + 40 - 16$

$0 = x^2 - 14x + 24$

$0 = (x-2)(x-12)$

set $x-2=0$ OR $x-12=0$

$x-2+2=0+2$ OR $x-12+12=0+12$

$x=2$ OR $x=12$ ✓

Ck $\log_4(x-4) + \log_4(x-10) = 2$

$\log_4(2-4) + \log_4(2-10) = 2$

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

BAD BAD

Ck $\log_4(12-4) + \log_4(12-10) = 2$

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

Good - Good

$\{12\}$

38. $\log_6(x^2-5x)=1$

$\log_6(x^2-5x)=1$

$6^1 = x^2-5x$

$6 = x^2-5x$

$6-6 = x^2-5x-6$

$0 = x^2-5x-6$

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

Let $x+1=0$ OR $x-6=0$

$x+1-1=0-1$ OR $x-6+6=0+6$

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

Ck $\log_6(x^2-5x)=1$

$\log_6((-1)^2-5(-1))=1$

$\log_6((-1)(-1)-5(-1))=1$

$\log_6(1+5)=1$

$\log_6(6)=1$

Good

Ck $\log_6(x^2-5x)=1$

$\log_6((6)^2-5(6))=1$

$\log_6((6)(6)-5(6))=1$

$\log_6(36-30)=1$

$\log_6(6)=1$

Good

$\{-1, 6\}$

(39) $\log_5(x-1) - \log_5(x-3) = 1$

(42.)

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

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

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

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

$5(x-3) = 1(x-1)$ cross mult

$5x - 15 = 1x - 1$

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

$5x = 1x + 14$

$5x - 1x = 1x + 14 - 1x$

$4x = 14$

$\frac{4x}{4} = \frac{14}{4}$

$x = \frac{14}{4}$

$x = \frac{2(7)}{2(2)}$

$x = \frac{7}{2}$

Ck

$\log_5\left(\frac{7}{2} - 1\right) - \log_5\left(\frac{7}{2} - 3\right) = 1$

$\log_5(3.5 - 1) - \log_5(3.5 - 3) = 1$

$\log_5(2.5) - \log_5(.5) = 1$

Good Good

$\left\{\frac{7}{2}\right\}$

(40) $\log(5+x) - \log(x-3) = \log(5)$

$\log\left(\frac{5+x}{x-3}\right) = \log(5)$

$\log\left(\frac{5+x}{x-3}\right) = \log(5)$

$\frac{5+x}{x-3} = 5$

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

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

$5 + x = 5x - 15$

$5 + x - 5 = 5x - 15 - 5$

$x = 5x - 20$

$x - 5x = 5x - 20 - 5x$

$1x - 5x = -20$

$-4x = -20$

$\frac{-4x}{-4} = \frac{-20}{-4}$

$x = 5$

(43)

Ck

$\log(5+x) - \log(x-3) = \log(5)$

$\log(5+5) - \log(5-3) = \log(5)$

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

Good Good Good

$\{5\}$

(41) $\log(x) + \log(x-1) = \log(12)$

(44)

$\log(x)(x-1) = \log(12)$

$\log(x)(x-1) = \log(12)$

$x(x-1) = 12$

$x^2 - x = 12$

$x^2 - x - 12 = 12 - 12$

$x^2 - x - 12 = 0$

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

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

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

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

Ck $\log(x) + \log(x-1) = \log(12)$

$\log(-3) + \log(-3-1) = \log(12)$

$\log(-3) + \log(-4) = \log(12)$

BAD BAD

Ck $\log(4) + \log(4-1) = \log(12)$

$\log(4) + \log(3) = \log(12)$

Good Good Good

$\{4\}$

(42) $5000 = 2500\left(1+\frac{.08}{4}\right)^{4t}$

(43)

$\frac{5000}{2500} = \frac{2500\left(1+\frac{.08}{4}\right)^{4t}}{2500}$

$2 = \left(1+\frac{.08}{4}\right)^{4t}$

$\ln(2) = \ln\left(1+\frac{.08}{4}\right)^{4t}$

$\ln(2) = 4t\ln\left(1+\frac{.08}{4}\right)$

$\frac{\ln(2)}{\left(4\ln\left(1+\frac{.08}{4}\right)\right)} = \frac{4t\ln\left(1+\frac{.08}{4}\right)}{\left(4\left(1+\frac{.08}{4}\right)\right)}$

$\frac{\ln(2)}{\left(4\ln\left(1+\frac{.08}{4}\right)\right)} = t$

OR use a graphing calculator

$8.750697195 = t$

(43) $504 = 800e^{-0.0077x}$

$\frac{504}{800} = \frac{800e^{-0.0077x}}{800}$

$.63 = e^{-0.0077x}$

$\ln(.63) = \ln(e^{-0.0077x})$

$\ln(.63) = -0.0077x \ln(e)$

$\ln(.63) = -0.0077x\ (1)$

$\ln(.63) = -0.0077x$

$\frac{\ln(.63)}{-0.0077} = \frac{-0.0077x}{-0.0077}$

60.00460514 = x

Use a graphing calculator

(49) $200 = 100e^{.025x}$

(47)

$\frac{200}{100} = \frac{100e^{.025x}}{100}$

$2 = e^{.025x}$

$\ln(2) = \ln(e^{.025x})$

$\ln(2) = .025x \ln(e)$

$\ln(2) = .025x(1)$

$\ln(2) = .025x$

$\frac{\ln(2)}{.025} = \frac{.025x}{.025}$

OR Use a graphing calculator

$\frac{\ln(2)}{.025} = x$

$27.72588722 = x$

(45.) $38 = 100\left(\frac{1}{2}\right)^{\frac{t}{5600}}$

$\frac{38}{100} = \frac{100\left(\frac{1}{2}\right)^{\frac{t}{5600}}}{100}$

$.38 = \left(\frac{1}{2}\right)^{\frac{t}{5600}}$

$\ln(.38) = \ln\left(\frac{1}{2}\right)^{\frac{t}{5600}}$

$\ln(.38) = \frac{t}{5600}\ln\left(\frac{1}{2}\right)$

$\frac{\ln(.38)}{\ln\left(\frac{1}{2}\right)} = \frac{\frac{t}{5600}\ln\left(\frac{1}{2}\right)}{\ln\left(\frac{1}{2}\right)}$

$\frac{\ln(.38)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{5600}$

$5600\frac{\ln(.38)}{\ln\left(\frac{1}{2}\right)} = 5600\left(\frac{t}{5600}\right)$

$5600\frac{\ln(.38)}{\ln\left(\frac{1}{2}\right)} = t$

OR use a graphing Calculator

$7817.200587 = t$

(46.)

$x+y+z=-6$

$x-y+3z=2$

$3x+y+z=-14$

use a graphing calculator

2ND

Matrix

Edit

[A]

set 3 x 4

$$[A] = \begin{bmatrix} 1 & 1 & 1 & -6 \\ 1 & -1 & 3 & 2 \\ 3 & 1 & 1 & -14 \end{bmatrix}$$

2ND Quit

2ND

matrix

Math

rref( ) =

$$rref([A]) = \begin{bmatrix} 1 & 0 & 0 & -4 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

$(x, y, z) = (-4, -3, 1)$

47. $\sum_{x=3}^{5} (x^2+2)$ (stop → 5, start → x=3)

50.

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

$(9+2)+(16+2)+(25+2) =$

$11 + 18 + 27 =$

$56 =$

Use a graphing Calculator

Math

Summation Σ

$\sum_{x=3}^{5} (x^2+2)$

enter

$56 =$

(48.) $(2x+3)^3$ Expand

Use Binomial theorem

(51)

$$(A+B)^N = {}_{N}C_{0}(A)^{N}(B)^{0} + {}_{N}C_{1}(A)^{N-1}(B)^{1} + \ldots + {}_{N}C_{N}(A)^{0}(B)^{N}$$

$${}_{3}C_{0}(2x)^{3}(3)^{0} + {}_{3}C_{1}(2x)^{2}(3)^{1} + {}_{3}C_{2}(2x)^{1}(3)^{2} + {}_{3}C_{3}(2x)^{0}(3)^{3} =$$

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

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

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

(49) $(x+2)^{15}$ Find 1st three terms

(52)

use Binomial theorem

$$(A+B)^N = {}_{N}C_{0}(A)^{N}(B)^{0} + {}_{N}C_{1}(A)^{N-1}(B)^{1} + \ldots + {}_{N}C_{N}(A)^{0}(B)^{N}$$

$${}_{15}C_{0}(x)^{15}(2)^{0} + {}_{15}C_{1}(x)^{14}(2)^{1} + {}_{15}C_{2}(x)^{13}(2)^{2} =$$

$$(1)(x^{15})(1) + (15)(x^{14})(2) + (105)(x^{13})(4) =$$

$$x^{15} + 30x^{14} + 420x^{13} =$$