1. Solve

$x^2 - x - 72 = 0$

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

let $x+8=0$ OR $x-9=0$

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

$x=-8$ OR $x=9$

72.1
36.2
18.4
9.8
Possible

M1314050 strand

Solve use Quadratic formula

$1x^2 - 1x - 72 = 0$

$a=1,\ b=-1,\ c=-72$

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

$$x = \frac{-(-1) \pm \sqrt{(-1)^2-4(1)(-72)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{1+288}}{2}$$

$$x = \frac{1 \pm \sqrt{289}}{2}$$

$$x = \frac{1 \pm 17}{2}$$

$x = \frac{1-17}{2}$ or $x = \frac{1+17}{2}$

$x = \frac{-16}{2}$ OR $x = \frac{18}{2}$

$x=-8$ or $x=9$

(2.) Solve

$x^2 = 2x + 15$

15.1, 3.5 Possible

(2.)

$x^2 - 2x - 15 = 0$

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

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

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

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

Solve use Quadratic formula

$1x^2 - 2x - 15 = 0$

$a=1 \quad b=-2 \quad c=-15$

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

$$x = \frac{-(-2) \pm \sqrt{(-2)^2-4(1)(-15)}}{2(1)}$$

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

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

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

$$x = \frac{2-8}{2} \text{ OR } x = \frac{2+8}{2}$$

$$x = \frac{-6}{2} \text{ OR } x = \frac{10}{2}$$

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

(3) Solve

$9x^2+21x-8=0$

9.1 3.3 8.1 2.4 Possibly

$(3x+8)(3x-1)=0$

Let $3x+8=0$ OR $3x-1=0$

$3x+8-8=0-8$ OR $3x-1+1=0+1$

$3x=-8$ OR $3x=1$

$\frac{3x}{3}=\frac{-8}{3}$ OR $\frac{3x}{3}=\frac{1}{3}$

$x=-\frac{8}{3}$ OR $x=\frac{1}{3}$

(3)

Solve use Quadratic formula

$9x^2+21x-8=0$

$a=9,\ b=21,\ c=-8$

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

$x=\frac{-(21)\pm\sqrt{(21)^2-4(9)(-8)}}{2(9)}$

$x=\frac{-21\pm\sqrt{441+288}}{18}$

$x=\frac{-21\pm\sqrt{729}}{18}$

$x=\frac{-21\pm27}{18}$

$x=\frac{-21-27}{18}$ OR $x=\frac{-21+27}{18}$

$x=\frac{-48}{18}$ OR $x=\frac{6}{18}$

$x=\frac{6(-8)}{6(3)}$ OR $x=\frac{6(1)}{6(3)}$

$x=-\frac{8}{3}$ OR $x=\frac{1}{3}$

(4) Solve

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

$(8x-3)(2x+1)=0$

16·1, 8·2, 4·4 (3·1) Possible (4)

Let $8x-3=0$ OR $2x+1=0$

$8x-3+3=0+3$ OR $2x+1-1=0-1$

$8x=3$ OR $2x=-1$

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

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

Solve using Quadratic formula

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

$a=16,\ b=2,\ c=-3$

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

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

$x=\frac{-2\pm\sqrt{4+192}}{32}$

$x=\frac{-2\pm\sqrt{196}}{32}$

$x=\frac{-2\pm14}{32}$

$x=\frac{-2+14}{32}$ OR $x=\frac{-2-14}{32}$

$x=\frac{12}{32}$ OR $x=\frac{-16}{32}$

$x=\frac{4(3)}{4(8)}$ OR $x=\frac{16(-1)}{16(2)}$

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

5. Solve

$5x^2 = 8x + 4$

$5x^2 - 8x - 4 = 0$

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

Let $5x + 2 = 0$ OR $x - 2 = 0$

$5x + 2 - 2 = 0 - 2$ OR $x - 2 + 2 = 0 + 2$

$5x = -2$ OR $x = 2$

$\frac{5x}{5} = \frac{-2}{5}$ OR

$x = -\frac{2}{5}$ OR

5.1 4.1 2.2 Possible

51

Solve use Quadratic formula

$5x^2 - 8x - 4 = 0$

$a = 5,\ b = -8,\ c = -4$

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

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

$x = \frac{8 \pm \sqrt{64 + 80}}{10}$

$x = \frac{8 \pm \sqrt{144}}{10}$

$x = \frac{8 \pm 12}{10}$

$x = \frac{8 - 12}{10}$ OR $x = \frac{8 + 12}{10}$

$x = \frac{-4}{10}$ OR $x = \frac{20}{10}$

$x = \frac{4(-2)}{4(5)}$ OR $x = \frac{10(2)}{10(1)}$

$x = -\frac{2}{5}$ OR $x = 2$

6. Solve by completing the square

$x^2 - 2x = 5$

$x^2 - 2x + \left(\frac{1}{2}(-2)\right)^2 = 5 + \left(\frac{1}{2}(-2)\right)^2$

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

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

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

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

$(x-1)^2 = 6$

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

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

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

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

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

6.

7. Solve using Quadratic formula

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

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

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

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

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

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

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

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

$$x = 2 \pm 3i$$

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

formula

$\sqrt{-1} = i$

8. Solve

$3x^2 - 24x + 48 = 0$

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

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

Let $3 \neq 0$ or $x-4=0$ or $x-4=0$

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

$x = 4$ or $x = 4$

Solve use Quadratic formula

$3x^2 - 24x + 48 = 0$

$a=3,\ b=-24,\ c=48$

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

$$x = \frac{-(-24) \pm \sqrt{(-24)^2 - 4(3)(48)}}{2(3)}$$

$$x = \frac{24 \pm \sqrt{576 - 576}}{6}$$

$$x = \frac{24 \pm \sqrt{0}}{6}$$

$$x = \frac{24 \pm 0}{6}$$

$$x = \frac{24-0}{6} \text{ or } x = \frac{24+0}{6}$$

$$x = \frac{24}{6} \text{ or } x = \frac{24}{6}$$

$x = 4$ or $x = 4$

9. Solve

$\sqrt{2x+20} = x+6$

$(\sqrt{2x+20})^2 = (x+6)^2$

$2x+20 = (x+6)(x+6)$

$2x+20 = x^2+6x+6x+36$

$2x+20 = x^2+12x+36$

$0 = x^2+12x+36-2x-20$

$0 = x^2+10x+16$

$0 = (x+2)(x+8)$

16.1 Possible
4.4

$x+2=0$ or $x+8=0$

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

$x=-2$ or $x=-8$

{-2}

Good BAD

Ck

$\sqrt{2x+20} = x+6$

$\sqrt{2(-2)+20} = (-2)+6$

$\sqrt{-4+20} = -2+6$

$\sqrt{16} = 4$

$4 = 4$

Good

Ck

$\sqrt{2x+20} = x+6$

$\sqrt{2(-8)+20} = -8+6$

$\sqrt{-16+20} = -2$

$\sqrt{4} = -2$

$2 \neq -2$

BAD

(10) Graph

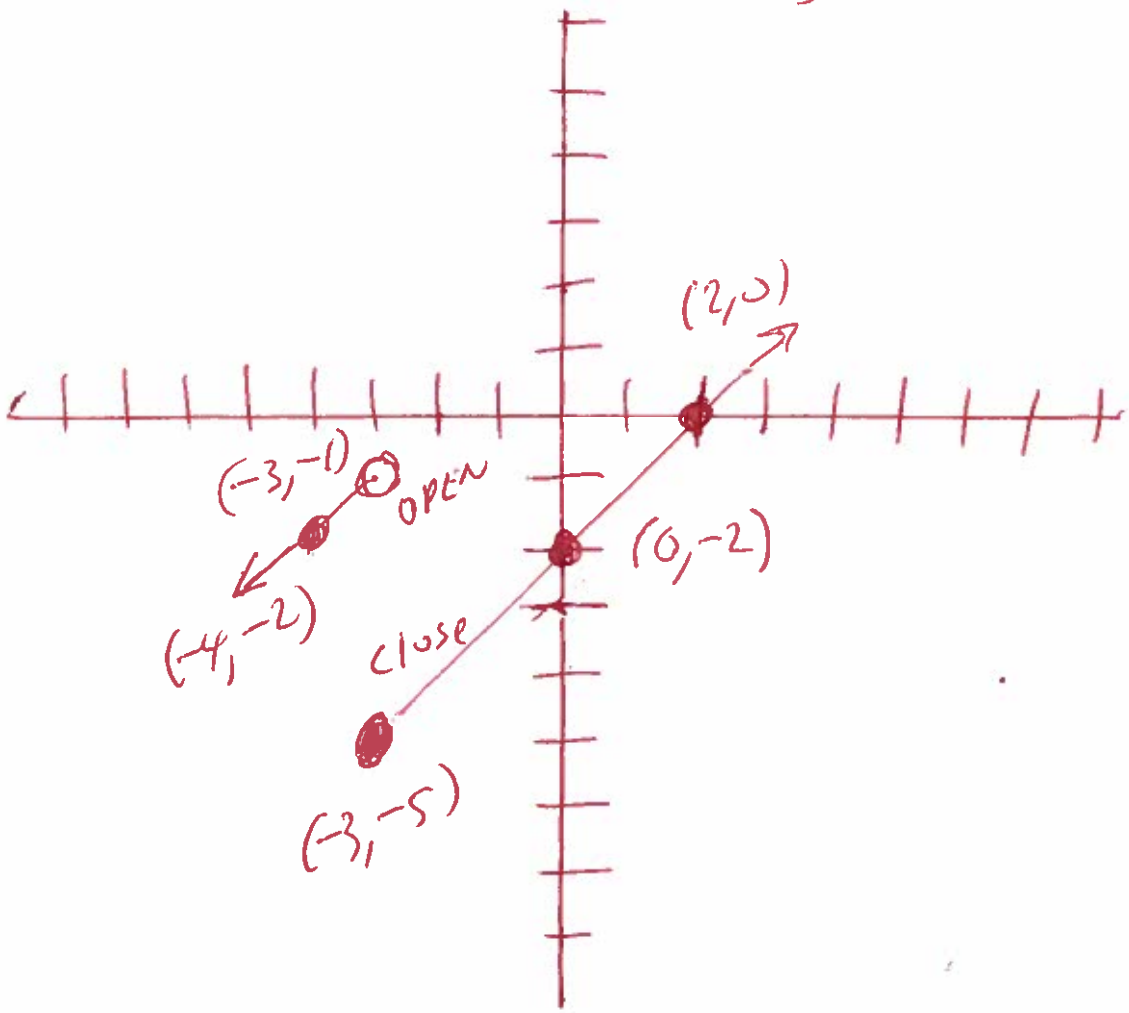
$$f(x) = \begin{cases} x+2 & \text{if } x < -3 \quad \text{OPEN} \\ x-2 & \text{if } x \geq -3 \quad \text{close} \end{cases}$$

(10.)

use graphing calculator

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

$y_2 = x-2 \div (x \geq -3)$ close



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

11.

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

$$\frac{\left((x+h)^2 - 2(x+h) + 6\right) - \left(x^2 - 2x + 6\right)}{h} =$$

$$\frac{(x+h)(x+h) - 2x - 2h + 6 - x^2 + 2x - 6}{h} =$$

$$\frac{x^2 + xh + xh + h^2 - 2x - 2h + 6 - x^2 + 2x - 6}{h} =$$

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

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

$$2x + h - 2 =$$

(12) Find Domain

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

but $16 - 2x \geq 0$

$16 - 2x - 16 \geq 0 - 16$

$-2x \geq -16$

$\frac{-2x}{-2} \leq \frac{-16}{-2}$

$x \leq 8$

8

$(-\infty, 8]$

(12)

formula

domain

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

but $Ax + B \geq 0$

(13) $f(x) = 2x^2 - 6x - 20$ and $g(x) = x - 5$

(13)

$(f+g)(x) =$

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

$(2x^2 - 6x - 20) + (x - 5) =$

$2x^2 - 6x - 20 + x - 5 =$

$2x^2 - 5x - 25 =$

domain $(-\infty, \infty)$

$(f-g)(x) =$

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

$(2x^2 - 6x - 20) - (x - 5) =$

$2x^2 - 6x - 20 - x + 5 =$

$2x^2 - 7x - 15 =$

domain $(-\infty, \infty)$

$(fg)(x) =$

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

$(2x^2 - 6x - 20)(x - 5) =$

$2x^3 - 10x^2 - 6x^2 + 30x - 20x + 100 =$

$2x^3 - 16x^2 + 10x + 100 =$

domain $-\infty, \infty$

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

$\frac{2x^2 - 6x - 20}{x - 5} =$

$\frac{2(x^2 - 3x - 10)}{x - 5} =$

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

$2(x+2) =$

$2x + 4 =$

domain $(-\infty, 5) \cup (5, \infty)$

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

(14)

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

$f(g(x)) =$

$f(4x^2 + x + 6) =$

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

$5 - 4x^2 - x - 6 =$

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

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

$g(f(x)) =$

$g(5 - x) =$

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

$4(5-x)(5-x) + (5-x) + 6 =$

$4(25 - 5x - 5x + x^2) + (5-x) + 6 =$

$4(x^2 - 10x + 25) + (5-x) + 6 =$

$4x^2 - 40x + 100 + 5 - x + 6 =$

$4x^2 - 41x + 111 =$

$(f \circ g)(x) = -4x^2 - x - 1$

$(f \circ g)(3) = -4(3)^2 - (3) - 1$

$(f \circ g)(3) = -4(3)(3) - 3 - 1$

$(f \circ g)(3) = -36 - 3 - 1$

$(f \circ g)(3) = -40$

$(g \circ f)(x) = 4x^2 - 41x + 111$

$(g \circ f)(3) = 4(3)^2 - 41(3) + 111$

$(g \circ f)(3) = 4(3)(3) - 41(3) + 111$

$(g \circ f)(3) = 4(9) - 41(3) + 111$

$(g \circ f)(3) = 36 - 123 + 111$

$(g \circ f)(3) = 24$

(15) Find the distance between the pair of points

(3, 6) and (7, 9) (15)

$x_1\ y_1 \qquad x_2\ y_2$

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

$$d = \sqrt{((3) - (7))^2 + ((6) - (9))^2}$$

$$d = \sqrt{(3-7)^2 + (6-9)^2}$$

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

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

$$d = \sqrt{25}$$

$$d = 5$$

16. Find the midpoint of the line segment with the given endpoints (8, 2) and (6, 10)

(19)

x_1 y_1 x_2 y_2

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

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

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

$$Mid = \left(\frac{14}{2}, \frac{12}{2}\right)$$

$$Mid = (7, 6)$$

17. Graph

(17)

$x^2+y^2+6x+10y+25=0$

$x^2+6x+y^2+10y=-25$ rewrite

$x^2+6x+\left(\frac{1}{2}(6)\right)^2+y^2+10y+\left(\frac{1}{2}(10)\right)^2=-25+\left(\frac{1}{2}(6)\right)^2+\left(\frac{1}{2}(10)\right)^2$

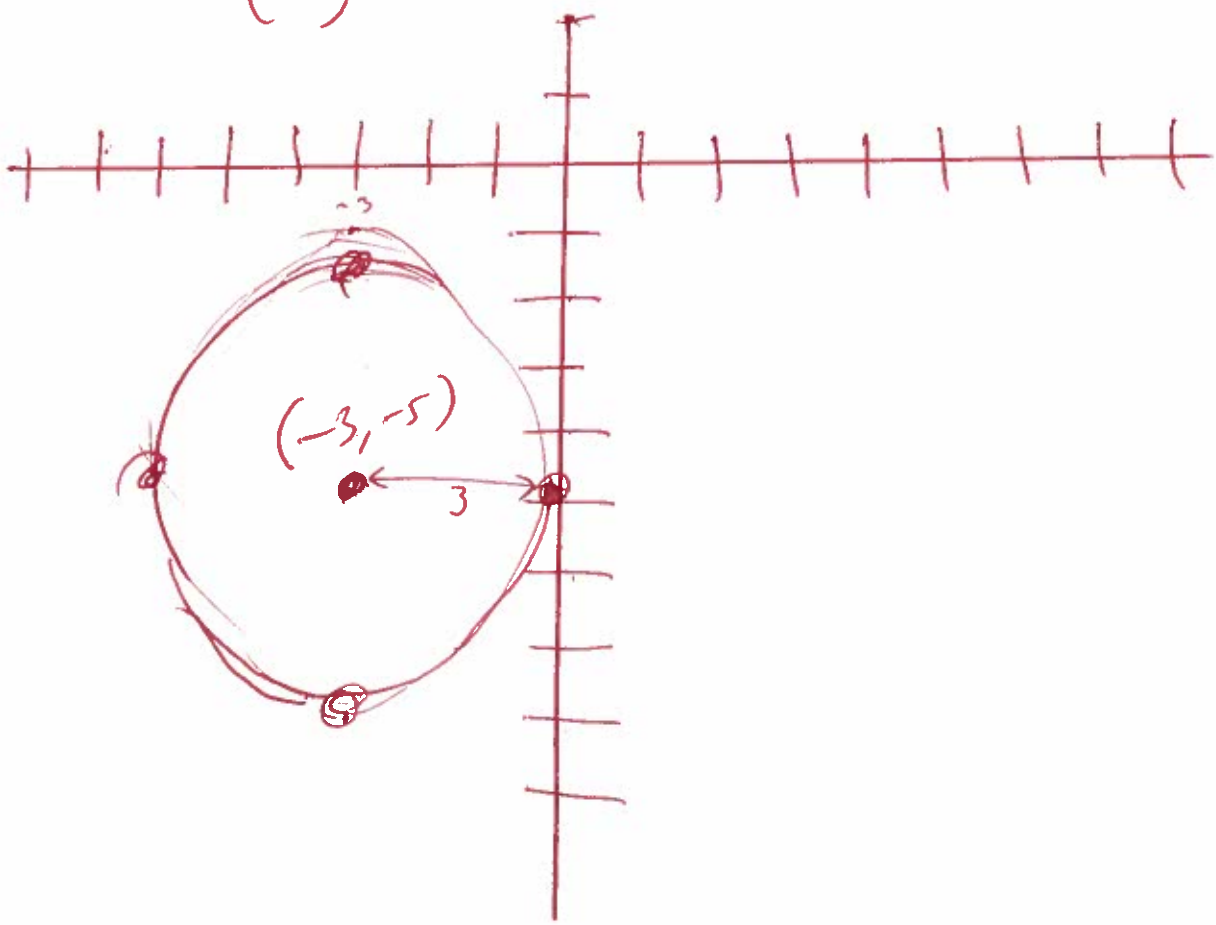
$x^2+6x+(3)^2+y^2+10y+(5)^2=-25+(3)^2+(5)^2$

$x^2+6x+9+y^2+10y+25=-25+9+25$

$(x+3)(x+3)+(y+5)(y+5)=9$

$(x+3)^2+(y+5)^2=9$

Center $=(-3,-5)$ Radius $=\sqrt{9}=3$



18. graph

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

x	f(x)
1	2
2	1
3	2

(18)

axis of symmetry $x = 2$

Vertex $= (2, 1)$

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

$= (-1)^2 + 1$

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

$= 1 + 1$

$= 2$

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

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

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

$f(2) = 0 + 1$

$f(2) = 1$

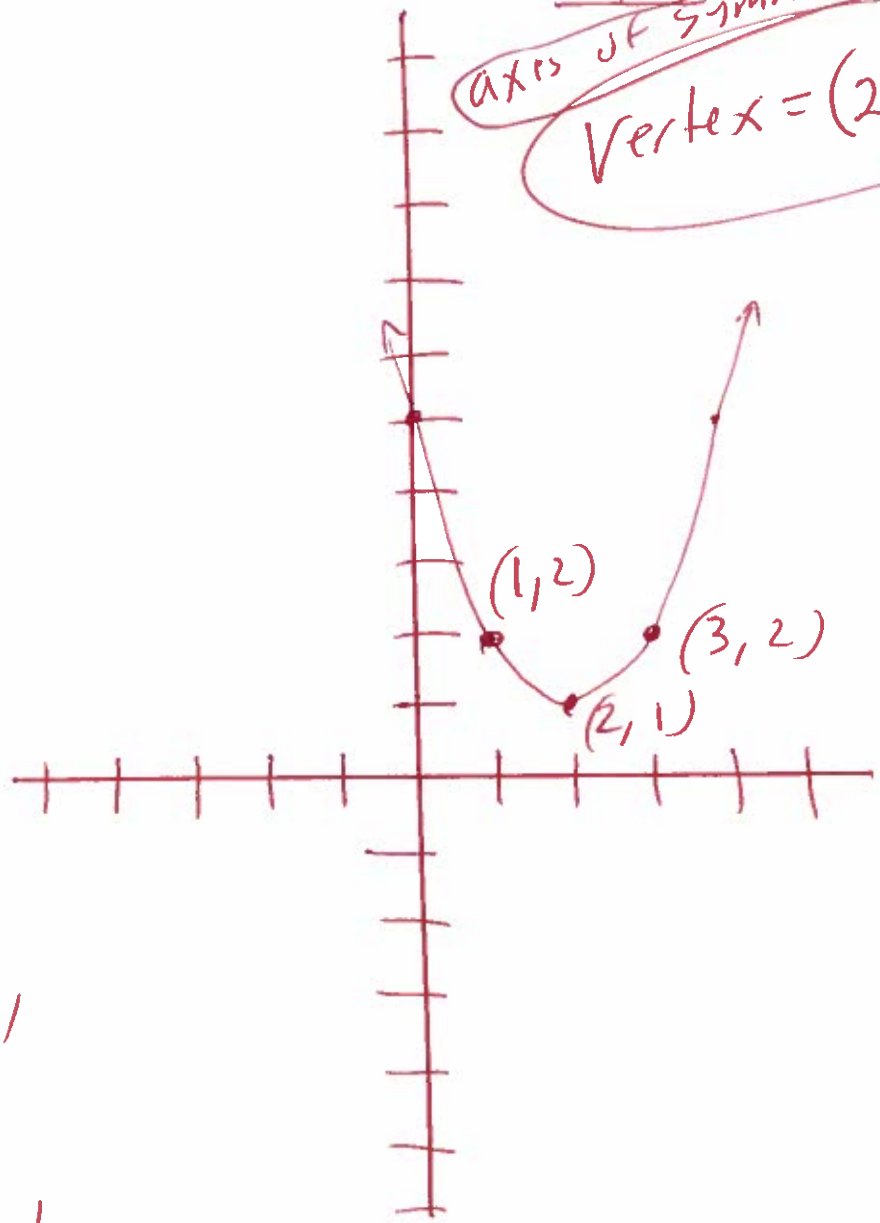
$f(3) = (3-2)^2 + 1$

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

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

$f(3) = 1 + 1$

$f(3) = 2$



19) Graph

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

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

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

$f(-2) = 4(-1)(-1) - 3$

$f(-2) = 4(1) - 3$

$f(-2) = 4 - 3$

$f(-2) = 1$

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

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

$f(-1) = 4(0)(0) - 3$

$f(-1) = 0 - 3$

$f(-1) = -3$

$f(0) = 4(0+1)^2 - 3$

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

$f(0) = 4(1)(1) - 3$

$f(0) = 4(1) - 3$

$f(0) = 4 - 3$

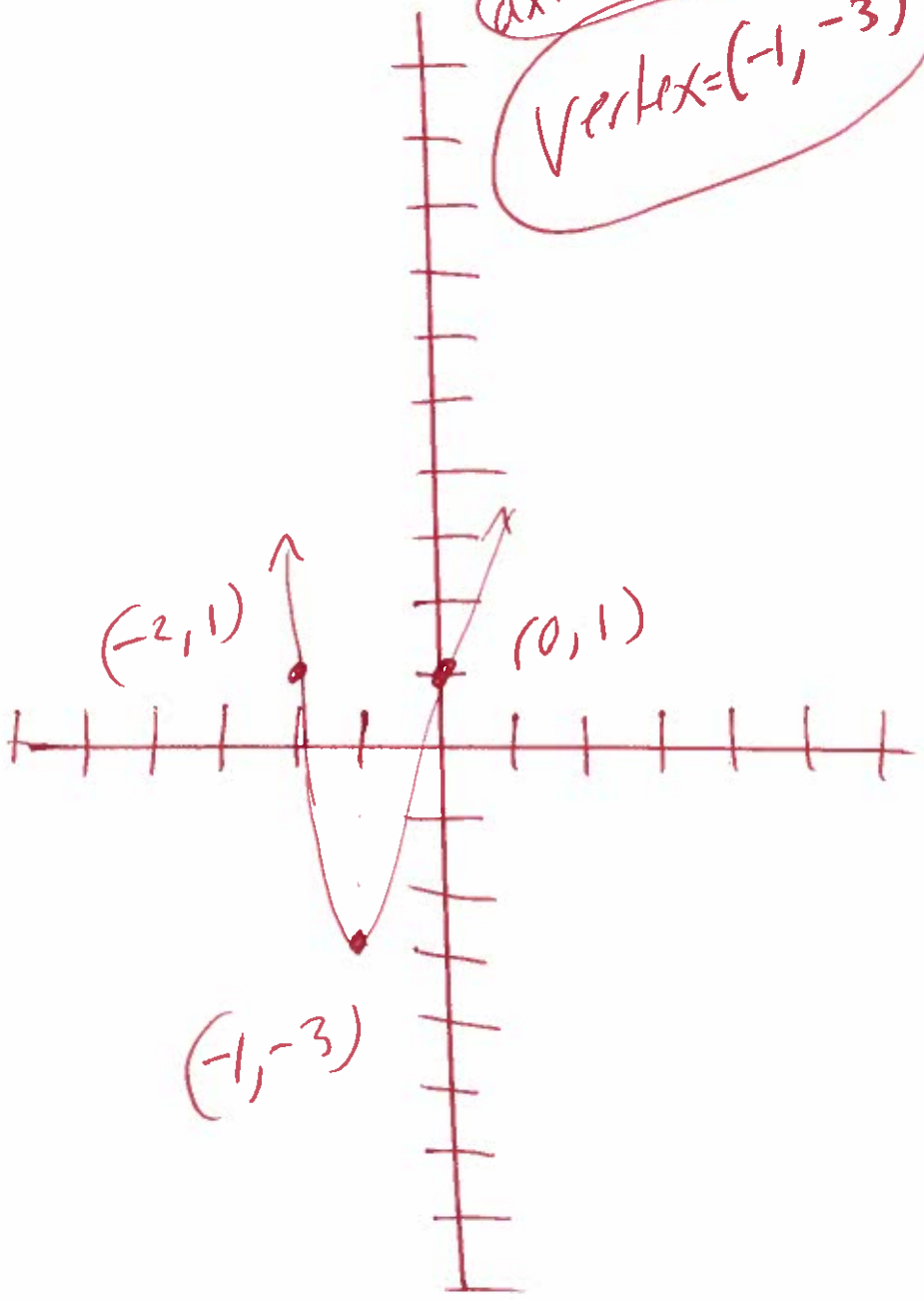
$f(0) = 1$

19)

x	f(x)
-2	1
-1	-3
0	1

axis of symmetry $x = -1$

Vertex $= (-1, -3)$



(20) graph

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

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

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

$f(2) = 4 - 12 + 8$

$f(2) = 0$

$f(3) = (3)^2 - 6(3) + 8$

$f(3) = (3)(3) - 6(3) + 8$

$f(3) = 9 - 18 + 8$

$f(3) = -1$

$f(4) = (4)^2 - 6(4) + 8$

$f(4) = (4)(4) - 6(4) + 8$

$f(4) = 16 - 24 + 8$

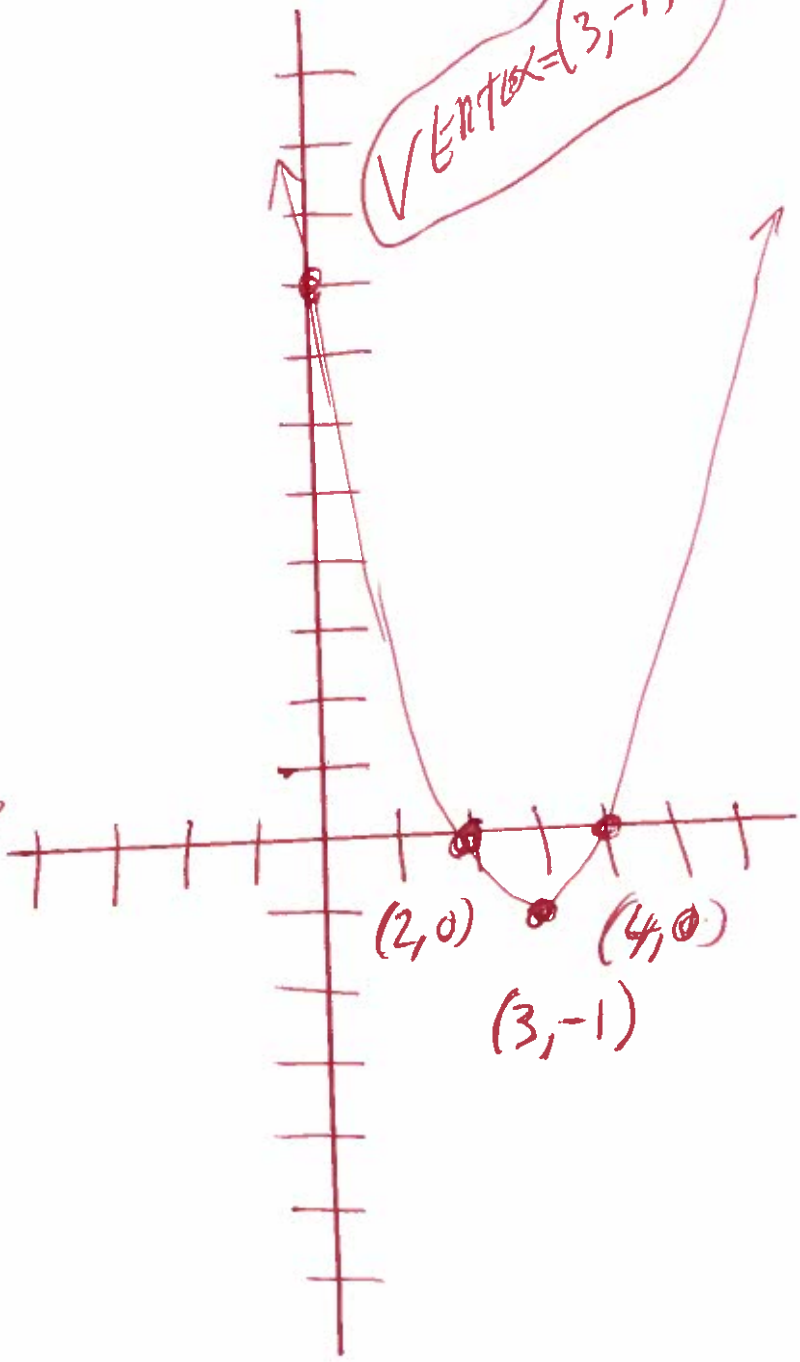
$f(4) = 0$

x	f(x)
2	0
3	-1
4	0

(20)

axis of symmetry $x = 3$

VERTEX = (3, -1)



21) Graph

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

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

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

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

$f(2) = -4 + 12 + 7$

$f(2) = 15$

$f(3) = -(3)^2 + 6(3) + 7$

$f(3) = -(3)(3) + 6(3) + 7$

$f(3) = -9 + 18 + 7$

$f(3) = 16$

$f(4) = -(4)^2 + 6(4) + 7$

$f(4) = -(4)(4) + 6(4) + 7$

$f(4) = -16 + 24 + 7$

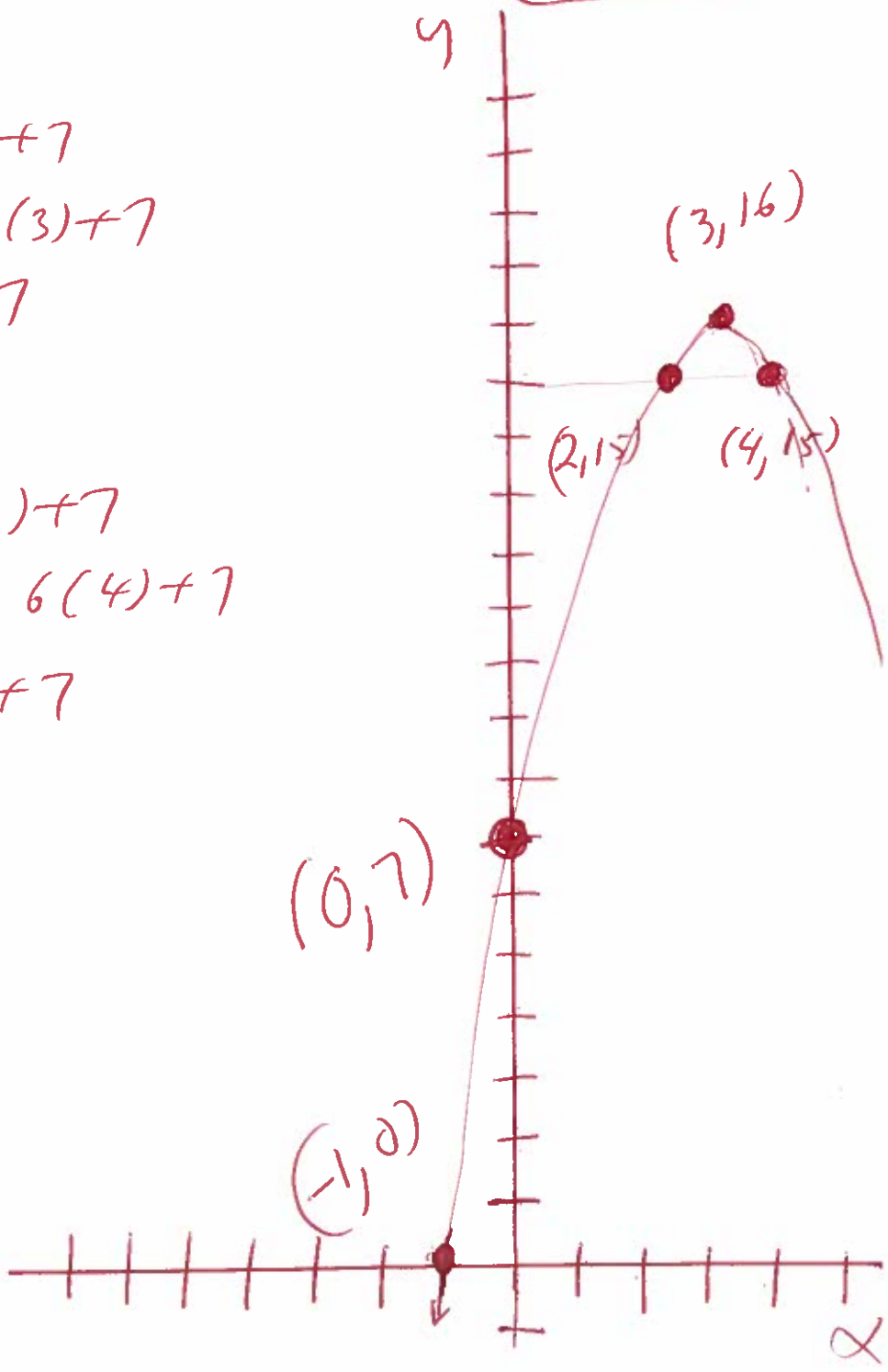
$f(4) = 15$

21)

x	f(x)
2	15
3	16
4	15

axis of symmetry $x = 3$

VERTEX (3, 16)



(22) Solve the equation $x^3 - 13x^2 + 47x - 35 = 0$ given that 1 is a zero of $f(x) = 1x^3 - 13x^2 + 47x - 35$

(22)

use synthetic division

1	1	-13	47	-35
		1	-12	35
	1	-12	35	0

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

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

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

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

$x = 5$ OR $x = 7$

$\{1, 5, 7\}$

(23) Solve $f(x) = -x^3 + 3x^2 + 13x - 15 = 0$ (23)

$\pm 15, \pm 5, \pm 3, \pm 1$ possible

1 | -1 | 3 | 13 | -15
-1 | 2 | 15
-1 | 2 | 15 | 0 Rem

use synthetic division

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

$-1(-x^2 + 2x + 15) = -1(0)$ mult by -1

$x^2 - 2x - 15 = 0$

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

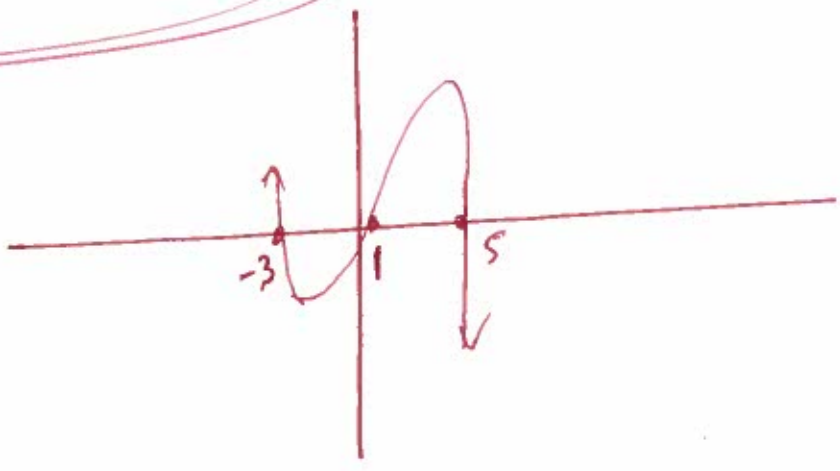
set $x + 3 = 0$ OR $x - 5 = 0$

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

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

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

graph



(24) Find the horizontal asymptote of $y = \frac{x-10}{3x^2+x+1}$ (24)

$\lim_{x \to \infty} \frac{x}{3x^2} =$

$\lim_{x \to \infty} \frac{1}{3x} =$

$0 =$

$y = 0$ horizontal asymptote

(25) Find the slant asymptote

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

(25)

$2 \;]\; 4 \quad -2 \quad 7$

$\qquad\qquad 8 \quad 12$

$4 \quad 6 \quad 19$

use Synthetic division

$y = 4x + 6$

SLANT Asymptote

(26.) find the vertical asymptote and holes.

$$f(x) = \frac{x-7}{x^2-12x+35}$$

(26.)

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

hole at $x=7$

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

Vertical asymptote $x-5=0$

$x-5+5=0+5$

$x=5$

27. Find the horizontal asymptote

27.

$$f(x) = \frac{16x}{2x^2+7}$$

$$\lim_{x \to \infty} \frac{16x}{2x^2} =$$

$$\lim_{x \to \infty} \frac{8}{x} =$$

$0 =$

$y = 0$ horizontal asymptote

(28) Find the horizontal asymptote

$$g(x) = \frac{12x^2}{3x^2 + 2}$$

(28)

$$y = HA = \frac{12x^2}{3x^2}$$

$y = 4$

horizontal asymptote

29 $f(x) = 1000(0.5)^{\frac{x}{30}}$

find $f(70) = 1000(0.5)^{\left(\frac{70}{30}\right)}$

29

graphing calculator

$1000(0.5)^{\wedge}(70/30)$

$f(70) = 198.4251315$

use graphing calculator

$f(70) = 198.4251315 > 100$

area is not safe for human habitation by 2054

2054
− 1984
70 YEARS LATER

(30.) Find the domain

$f(x) = \log(6-x)$

Let $6-x > 0$

$6-x-6 > 0-6$

$-x > -6$

$\frac{-x}{-1} < \frac{-6}{-1}$

$x < 6$

6

$(-\infty, 6)$

(32)

formula

domain

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

Let $Ax+B > 0$

(31) Expand

(31)

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

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

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

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

formulas

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

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

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

32. expand

$$\ln\left(\frac{x^6\sqrt{x^2+9}}{(x+9)^9}\right)=$$

32.

$$\ln(x^6\sqrt{x^2+9}) - \ln(x+9)^9 =$$

$$\ln(x^6) + \ln\sqrt{x^2+9} - \ln(x+9)^9 =$$

$$\ln(x^6) + \ln(x^2+9)^{1/2} - \ln(x+9)^9 =$$

$$6\ln(x) + \frac{1}{2}\ln(x^2+9) - 9\ln(x+9) =$$

formulas

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

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

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

33. Solve

$25^{x+5} = 625^{x-4}$

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

$5^{2x+10} = 5^{4x-16}$

$2x+10 = 4x-16$

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

$2x = 4x-26$

$2x-4x = 4x-26-4x$

$-2x = -26$

$\frac{-2x}{-2} = \frac{-26}{-2}$

$x = 13$

33.

34. Solve

$$7^{x+3} = 257$$

$$\ln(7^{x+3}) = \ln(257)$$

$$(x+3)\ln(7) = \ln(257)$$

$$\frac{(x+3)\ln(7)}{\ln(7)} = \frac{\ln(257)}{\ln(7)}$$

$$x+3 = \frac{\ln(257)}{\ln(7)}$$

$$x+3-3 = \frac{\ln(257)}{\ln(7)} - 3$$

$$x = \frac{\ln(257)}{\ln(7)} - 3$$

OR

$$x = -.148338583$$

OR Round

$$x = -0.15$$

35.

Solve

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

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

$6^1 = (x)(5x-1)$

$6 = 5x^2 - x$

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

$0 = (5x-6)(x+1)$

$5x-6=0$ OR $x+1=0$

$5x-6+6=0+6$ OR $x+1-1=0-1$

$5x=6$

$\frac{5x}{5} = \frac{6}{5}$ OR $x=-1$ BAD

$x = \frac{6}{5}$ good

Ck

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

$\log_6\left(\frac{6}{5}\right) + \log_6\left(5\left(\frac{6}{5}\right)-1\right) = 1$

$\log_6\left(\frac{6}{5}\right) + \log_6(6-1) = 1$

$\log_6\left(\frac{6}{5}\right) + \log_6(5) = 1$

good

Ck

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

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

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

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

BAD BAD

35.

5.1

6.1
2.3

possible

$\left\{\frac{6}{5}\right\}$

answer

36

Solve

$\log_5(x+2) + \log_5(x+122) = 4$

$\log_5(x+2)(x+122) = 4$

36

$5^4 = (x+2)(x+122)$

$625 = x^2 + 122x + 2x + 244$

$625 = x^2 + 124x + 244$

$0 = x^2 + 124x + 244 - 625$

$0 = x^2 + 124x - 381$

$0 = (x-3)(x+127)$

$x-3=0$ OR $x+127=0$

$x-3+3=0+3$ OR $x+127-127=0-127$

$x=3$ OR $x=-127$

Ck good Ck BAD

$\begin{cases} x=3 \\ \text{answer} \end{cases}$

$\log_5(x+2) + \log_5(x+122) = 4$

$\log_5(3+2) + \log_5(3+122) = 4$

$\log_5(5) + \log_5(125) = 4$

Good Good

$\log_5(x+2) + \log_5(x+122) = 4$

$\log_5(-127+2) + \log_5(-127+122) = 4$

$\log_5(-125) + \log_5(-5) = 4$

BAD BAD

(37) Solve

$\log_6(x+31) - \log_6(x-4) = 2$

$\log_6\left(\frac{x+31}{x-4}\right) = 2$

(37)

$6^2 = \frac{x+31}{x-4}$

$\frac{36}{1} = \frac{x+31}{x-4}$ cross Mult

$36(x-4) = 1(x+31)$

$36x - 144 = 1x + 31$

$36x - 144 + 144 = 1x + 31 + 144$

$36x = 1x + 175$

$36x - 1x = 1x + 175 - 1x$

$35x = 175$

$\frac{35x}{35} = \frac{175}{35}$

$x = 5$ Good

$\{x = 5\}$

Ck $\log_6(x+31) - \log_6(x-4) = 2$

$\log_6(5+31) - \log_6(5-4) = 2$

$\log_6(36) - \log_6(1) = 2$

Good Good

38

Solve

$\log(x) + \log(x-7) = \log(8)$

38

$\log(x)(x-7) = \log(8)$

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

$x^2 - 7x = 8$

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

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

so $x+1=0$ OR $x-8=0$

$x+1-1=0-1$ OR $x-8+8=0+8$

$x=-1$ OR $x=8$

BAD good

Ck

$\log(x) + \log(x-7) = \log(8)$

$\log(-1) + \log(-1-7) = \log(8)$

$\log(-1) + \log(-8) = \log(8)$

BAD BAD

$\{x=8\}$ ANSWER

$\log(x) + \log(x-7) = \log(8)$

$\log(8) + \log(8-7) = \log(8)$

$\log(8) + \log(1) = \log(8)$

good good good

(39) Solve

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

$A = 17000$

$P = 12000$

$r = 6.25\% = .0625$

$n = 2$

(35)

$$17000 = 12000\left(1+\frac{.0625}{2}\right)^{2t}$$

$$\frac{17000}{12000} = \frac{12000\left(1+\frac{.0625}{2}\right)^{2t}}{12000}$$

$$1.416666666 = \left(1+\frac{.0625}{2}\right)^{2t}$$

$$\ln(1.416666666) = \ln\left(1+\frac{.0625}{2}\right)^{2t}$$

$$\ln(1.416666666) = 2t\ln\left(1+\frac{.0625}{2}\right)$$

$$\frac{\ln(1.416666666)}{\ln\left(1+\frac{.0625}{2}\right)} = \frac{2t\ln\left(1+\frac{.0625}{2}\right)}{\ln\left(1+\frac{.0625}{2}\right)}$$

$$\frac{\ln(1.416666666)}{\ln\left(1+\frac{.0625}{2}\right)} = 2t$$

$$\frac{1}{2}\cdot\frac{\ln(1.416666666)}{\ln\left(1+\frac{.0625}{2}\right)} = \frac{1}{2}(2t)$$

$$\frac{\ln(1.416666666)}{2\ln\left(1+.0625/2\right)} = t$$

$5.6595537199 = t$

Round

$5.7 = t$

OR

ANSWER

40.

Start

$A = 127.1e^{0.03t}$

Start 2003

40.

$182 = 127.1e^{0.03t}$

$\frac{182}{127.1} = \frac{127.1e^{0.03t}}{127.1}$

$1.431943352 = e^{0.03t}$

$\ln(1.431943352) = \ln(e^{0.03t})$

$\ln(1.431943352) = 0.03t \ln(e)$

$\ln(1.431943352) = 0.03t(1)$

$\ln(1.431943352) = 0.03t$

$\frac{\ln(1.431943352)}{0.03} = \frac{0.03t}{0.03}$

$11.96775503 = t$

YEARS

$12 = t$

Round

2003

+ 12 add YEARS Late,

2015 YEAR

ANSWER

41. Evaluate if $t = 9679$

$A = 16e^{-0.000121t}$

$A = 16e^{-0.000121(9679)}$

$A = 16e^{\wedge}(-0.000121(9679))$

$A = 4.960118351$

OR Round

$A = 5$

41

(42.)

Solve

$21 = 100e^{-0.000121t}$

(42.)

$21 = 100e^{-0.000121t}$

$\frac{21}{100} = \frac{100e^{-0.000121t}}{100}$

$.21 = e^{-0.000121t}$

$\ln(.21) = \ln(e^{-0.000121t})$

$\ln(.21) = -0.000121t \ln(e)$

$\ln(.21) = -0.000121t \ (1)$

$\ln(.21) = -0.000121t$

$\frac{\ln(.21)}{-0.000121} = \frac{-0.000121t}{-0.000121}$

$12897.91527 = t$

OR Round

$12898 = t$

(43) Find the time to double.

(43)

$$A = 6e^{0.004t}$$

$$12 = 6e^{0.004t}$$

$$\frac{12}{6} = \frac{6e^{0.004t}}{6}$$

$$2 = e^{0.004t}$$

$$\ln(2) = \ln(e^{0.004t})$$

$$\ln(2) = 0.004t \ln(e)$$

$$\ln(2) = 0.004t(1)$$

$$\ln(2) = 0.004t$$

$$\frac{\ln(2)}{0.004} = \frac{0.004t}{0.004}$$

$$173.28679951 = t$$

OR Round

$$173 \approx t$$

(44) Solve

$x+y+3z=1$

$x+y+8z=6$

$x-6y-8z=-17$

(44)

Use graphing Calculator

2ND

matrix

Edit

[A]

Enter

3 x 4

$$[A]=\begin{bmatrix} 1 & 1 & 3 & 1 \\ 1 & 1 & 8 & 6 \\ 1 & -6 & -8 & -17 \end{bmatrix}$$

2ND Quit

2ND

matrix

MATH

rref( )

rref([A])

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

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

Answer

45.

$$\sum_{X=1}^{4} X(X+4)$$

45.

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

$70 =$

OR use Graphing calculator

MATH

Summation $\Sigma($

$$\sum_{\square=\square}^{\square} (\square) =$$

$$\sum_{X=1}^{4} (X(X+4)) =$$

$70 =$

(46) Expand use binomial theorem

$(x+2)^3 =$

(46)

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

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

$$x^3 + 6x^2 + 12x + 8 =$$

use graphing Calculator

(47) Expand using binomial theorem (47)

$(8x+y)^3 =$

$${}_3C_0(8x)^3(y)^0 + {}_3C_1(8x)^2(y)^1 + {}_3C_2(8x)^1(y)^2 + {}_3C_3(8x)^0(y)^3 =$$

$$(1)(512x^3)(1) + (3)(64x^2)(y) + (3)(8x)(y^2) + (1)(1)(y^3) =$$

$$512x^3 + 192x^2y + 24xy^2 + y^3 =$$

Use a graphing calculator

(47) Expand $(3x-1)^3$

(48)

$$\binom{3}{0}(3x)^3(-1)^0 + \binom{3}{1}(3x)^2(-1)^1 + \binom{3}{2}(3x)^1(-1)^2 + \binom{3}{3}(3x)^0(-1)^3 =$$

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

$$27x^3 - 27x^2 + 9x - 1$$

(49) find the 1st three terms
use binomial theorem

(49)

$(x+6)^5$

$${}_5C_0(x)^5(6)^0 + {}_5C_1(x)^4(6)^1 + {}_5C_2(x)^3(6)^2 =$$

$$(1)(x^5)(1) + (5)(x^4)(6) + (10)(x^3)(36) =$$

$$x^5 + 30x^4 + 360x^3 =$$

(50.) Find the 1st three terms
use binomial theorem

(50.)

$$(x-3y)^{10}$$

$$\binom{10}{0}(x)^{10}(-3y)^{0} + \binom{10}{1}(x)^{9}(-3y)^{1} + \binom{10}{2}(x)^{8}(-3y)^{2} =$$

$$(1)(x^{10})(1) + (10)(x^{9})(-3y) + (45)(x^{8})(9y^{2}) =$$

$$x^{10} - 30x^{9}y + 405x^{8}y^{2} =$$