1.

① Solve (by factoring)

$14x^2+3x-2=0$

14.1 2.7 — 1.2 ← possible

M13/4044 step 030811

$(2x+1)(7x-2)=0$

Step by step solutions

Set $2x+1=0$ or $7x-2=0$

$2x+1-1=0-1$ or $7x-2+2=0+2$

$2x=-1$ or $7x=2$

$\frac{2x}{2}=\frac{-1}{2}$ or $\frac{7x}{7}=\frac{2}{7}$

$x=-1/2$ or $x=2/7$

OR use Quadratic formula

$14x^2+3x-2=0$

$a=14,\ b=3,\ c=-2$

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

$x=\frac{-(3)\pm\sqrt{(3)^2-4(14)(-2)}}{2(14)}$

$x=\frac{-3\pm\sqrt{9+112}}{28}$

$x=\frac{-3\pm\sqrt{121}}{28}$

$x=\frac{-3\pm11}{28}$

$x=\frac{-3-11}{28}$ or $x=\frac{-3+11}{28}$

$x=\frac{-14}{28}$ or $x=\frac{8}{28}$

$x=\frac{14(-1)}{14(2)}$ or $x=\frac{4(2)}{4(7)}$

$x=-1/2$ or $x=2/7$

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

(2) Solve (by factoring)

$5x^2 = 18x + 35$

$5x^2 - 18x - 35 = 0$

5 · 1 | 35 · 1 | 7 · 5 | Possible

rewrite first

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

Set $5x + 7 = 0$ or $x - 5 = 0$

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

$5x = -7$ or $x = 5$

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

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

Or use Quadratic formula

$5x^2 - 18x - 35 = 0$

$a = 5;\ b = -18,\ c = -35$

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

$x = \frac{-(-18) \pm \sqrt{(-18)^2 - 4(5)(-35)}}{2(5)}$

$x = \frac{18 \pm \sqrt{324 + 700}}{10}$

$x = \frac{18 \pm \sqrt{1024}}{10}$

$x = \frac{18 \pm 32}{10}$

$x = \frac{18 - 32}{10}$ OR $x = \frac{18 + 32}{10}$

$x = \frac{-14}{10}$ OR $x = \frac{50}{10}$

$x = \frac{2(-7)}{2(5)}$ OR $x = \frac{50}{10}$

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

$\left\{-\frac{7}{5}, 5\right\}$

(3.) Solve (use Quadratic Formula)

3.

$1x^2 - 2x + 26 = 0$

$a=1, \quad b=-2, \quad c=26$

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

$$x = \frac{-(-2) \pm \sqrt{(-2)^2-4(1)(26)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4-104}}{2}$$

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

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

$$x = 1 \pm 5i$$

$x = 1+5i$ or $x = 1-5i$

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

(4) Solve

$\sqrt{2x+11} = x+4$

$(\sqrt{2x+11})^2 = (x+4)^2$

$2x+11 = (x+4)(x+4)$

$2x+11 = x^2+4x+4x+16$

$2x+11 = x^2+8x+16$

$0 = x^2+8x+16-2x-11$

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

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

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

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

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

Good Check

$\sqrt{2x+11} = x+4$

$\sqrt{2(-1)+11} = (-1)+4$

$\sqrt{-2+11} = -1+4$

$\sqrt{9} = 3$

$3 = 3$

Good

$\sqrt{2x+11} = x+4$

$\sqrt{2(-5)+11} = (-5)+4$

$\sqrt{-10+11} = -5+4$

$\sqrt{1} = -1$

$1 \neq -1$

BAD

ANSWER $\{-1\}$

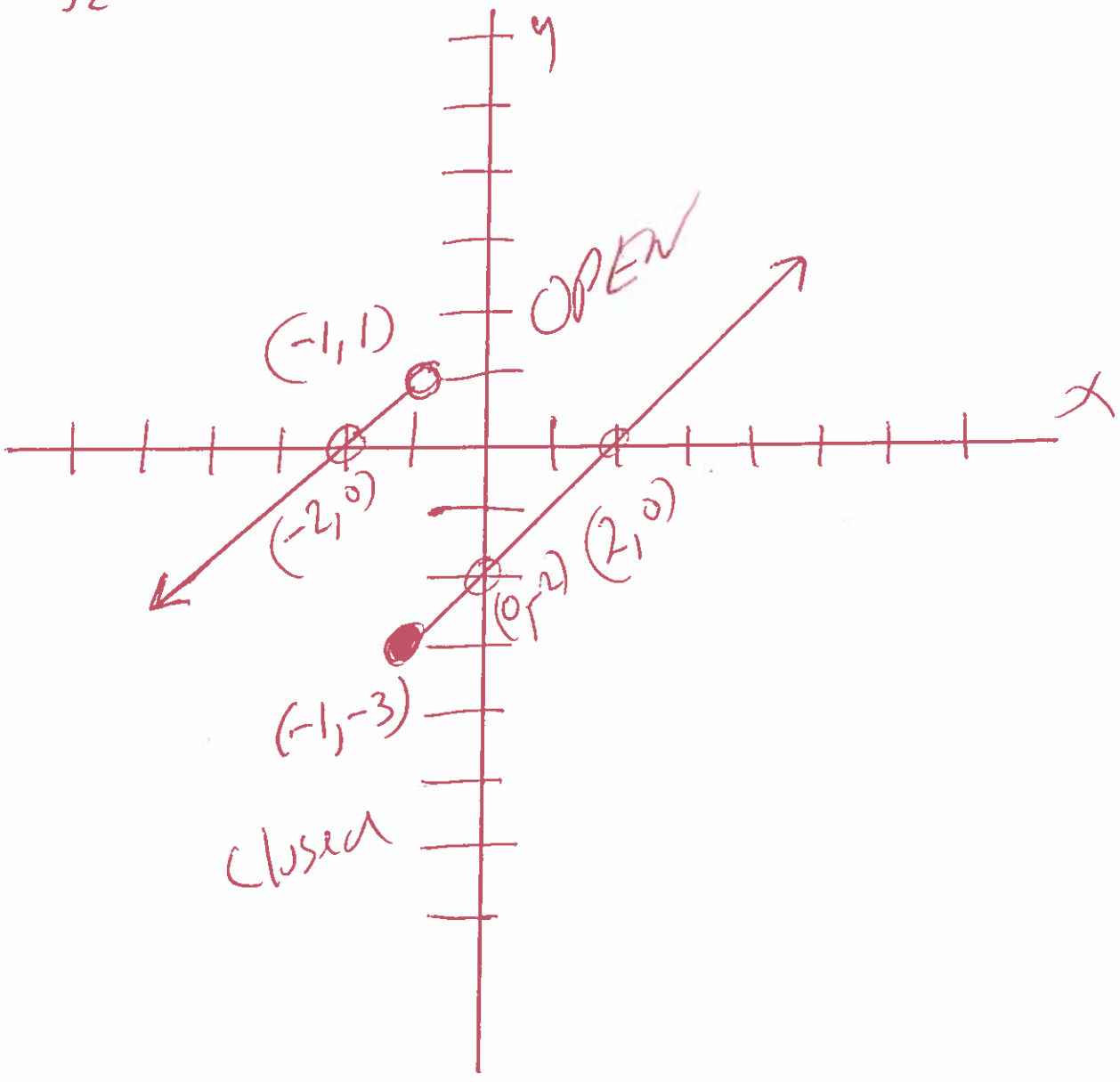
(5) graph

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

Use a graphing calculator

$y_1 = x+2 \ \frac{\circ}{\circ} (x < -1)$ open

$y_2 = x-2 \ \frac{\circ}{\circ} (x \geq -1)$ closed



⑥ $f(x) = x^2 - 7x + 3$

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

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

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

$$\frac{x^2 + xh + xh + h^2 - 7x - 7h + 3 - x^2 + 7x - 3}{h} =$$

$$\frac{x^2 + 2xh + h^2 - 7x - 7h + 3 - x^2 + 7x - 3}{h} =$$

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

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

$$2x + h - 7 =$$

7. Find the domain

$f(x) = \sqrt{45 - 5x}$

Set $45 - 5x \geq 0$

$45 - 5x - 45 \geq 0 - 45$

$-5x \geq -45$

$\frac{-5x}{-5} \leq \frac{-45}{-5}$

Divide
Turn the alligator around.

$x \leq 9$

9

$(-\infty, 9]$

formula
domain
$f(x) = \sqrt{Ax + B}$
Set $Ax + B \geq 0$

1

(8) If $f(x) = 2x^2+11x+14$ and $g(x) = x+2$

$(f+g)(x) =$

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

$(2x^2+11x+14)+(x+2) =$

$2x^2+11x+14+x+2 =$

$2x^2+12x+16 =$ Domain of $f+g$ is $(-\infty, \infty)$

$(f-g)(x) =$

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

$(2x^2+11x+14)-(x+2) =$

$2x^2+11x+14-x-2 =$

$2x^2+10x+12 =$ Domain of $f-g$ is $(-\infty, \infty)$

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

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

$(2x^2+11x+14)(x+2) =$

$2x^3+4x^2+11x^2+22x+14x+28 =$

$2x^3+15x^2+36x+28 =$ Domain of $f \cdot g$ is $(-\infty, \infty)$

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

$\frac{2x^2+11x+14}{x+2} =$

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

$2x+7 =$

Domain of $\frac{f}{g}$ is $(-\infty, -2) \cup (-2, \infty)$ since $\frac{f}{g}$ is undefined at $x = -2$

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

$(fog)(x) =$

$f(g(x)) =$

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

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

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

$-2x^2 - x - 6 =$ ✓

$(gof)(x) =$

$g(f(x)) =$

$g(3 - x) =$

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

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

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

$2(9 - 6x + x^2) + 3 - x + 9 =$

$18 - 12x + 2x^2 + 3 - x + 9 =$ ✓

$2x^2 - 13x + 30 =$

$(fog)(x) = -2x^2 - x - 6$

$(fog)(2) = -2(2)^2 - (2) - 6$

$(fog)(2) = -2(2)(2) - (2) - 6$

$(fog)(2) = -8 - 2 - 6$ ✓

$(fog)(2) = -16$

$(gof)(x) = 2x^2 - 13x + 30$

$(gof)(2) = 2(2)^2 - 13(2) + 30$

$(gof)(2) = 2(2)(2) - 13(2) + 30$

$(gof)(2) = 8 - 26 + 30$ ✓

$(gof)(2) = 12$

(10.) Find the distance between the pair of points (7, 5) and (16, 17)

10

x_1 y_1 x_2 y_2

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

$$d = \sqrt{((7) - (16))^2 + ((5) - (17))^2}$$

$$d = \sqrt{(7-16)^2 + (5-17)^2}$$

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

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

$$d = \sqrt{225}$$

$$d = 15$$ ✓

(11.) Find the midpoint

(4, 2) and (8, 10)

x_1 y_1 x_2 y_2

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

$$\text{Midpoint} = \left(\frac{(4)+(8)}{2}, \frac{(2)+(10)}{2}\right)$$

$$\text{Midpoint} = \left(\frac{4+8}{2}, \frac{2+10}{2}\right)$$

$$\text{Midpoint} = \left(\frac{12}{2}, \frac{12}{2}\right)$$

$$\text{Midpoint} = (6, 6)$$

(12.) Graph

12

$x^2+y^2+6x+8y+24=0$

$x^2+6x+y^2+8y=-24$

$x^2+6x+\left(\frac{1}{2}(6)\right)^2+y^2+8y+\left(\frac{1}{2}(8)\right)^2=-24+\left(\frac{1}{2}(6)\right)^2+\left(\frac{1}{2}(8)\right)^2$

$x^2+6x+(3)^2+y^2+8y+(4)^2=-24+(3)^2+(4)^2$

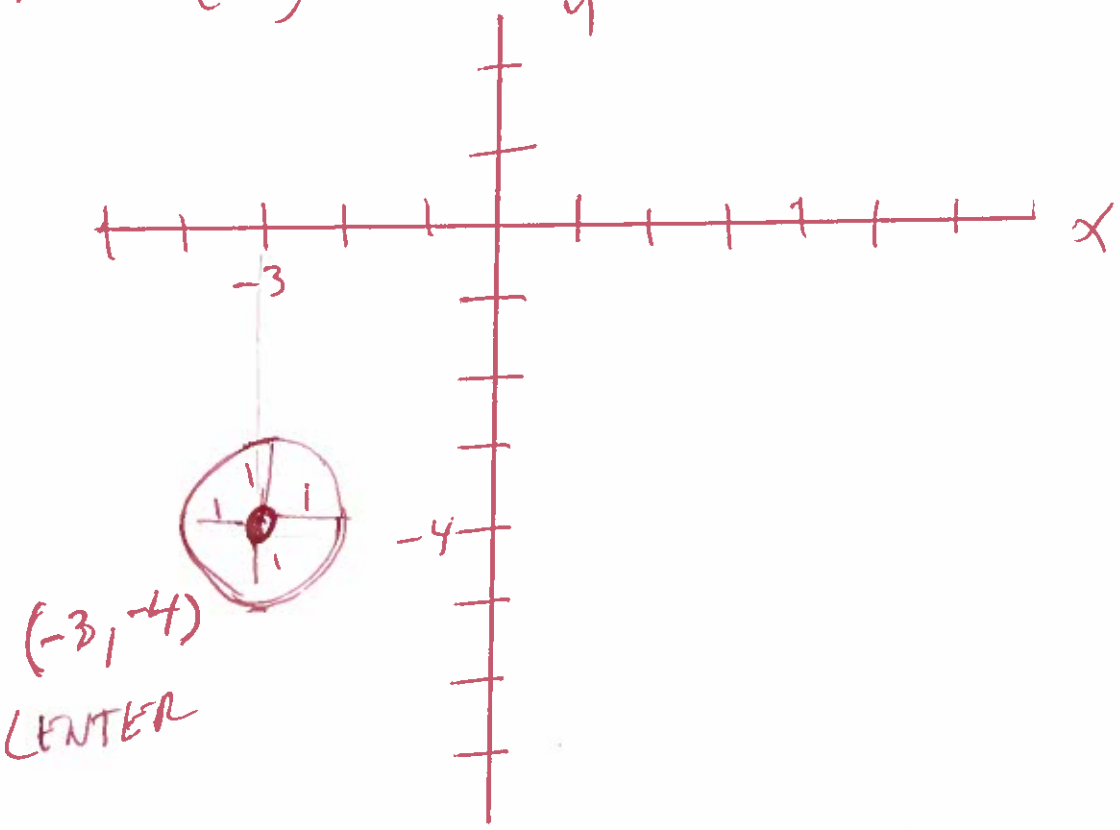
$x^2+6x+9+y^2+8y+16=-24+9+16$

Always Factor

$(x+3)(x+3)+(y+4)(y+4)=1$

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

CENTER $=(-3,-4)$ Radius $=\sqrt{1}=1$



13. graph $f(x) = (x-1)^2 + 1$

OR use a graphing calculator

x	f(x)
0	2
1	1
2	2

13.

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

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

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

$f(0) = 1 + 1$

$f(0) = 2$

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

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

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

$f(1) = 0 + 1$

$f(1) = 1$

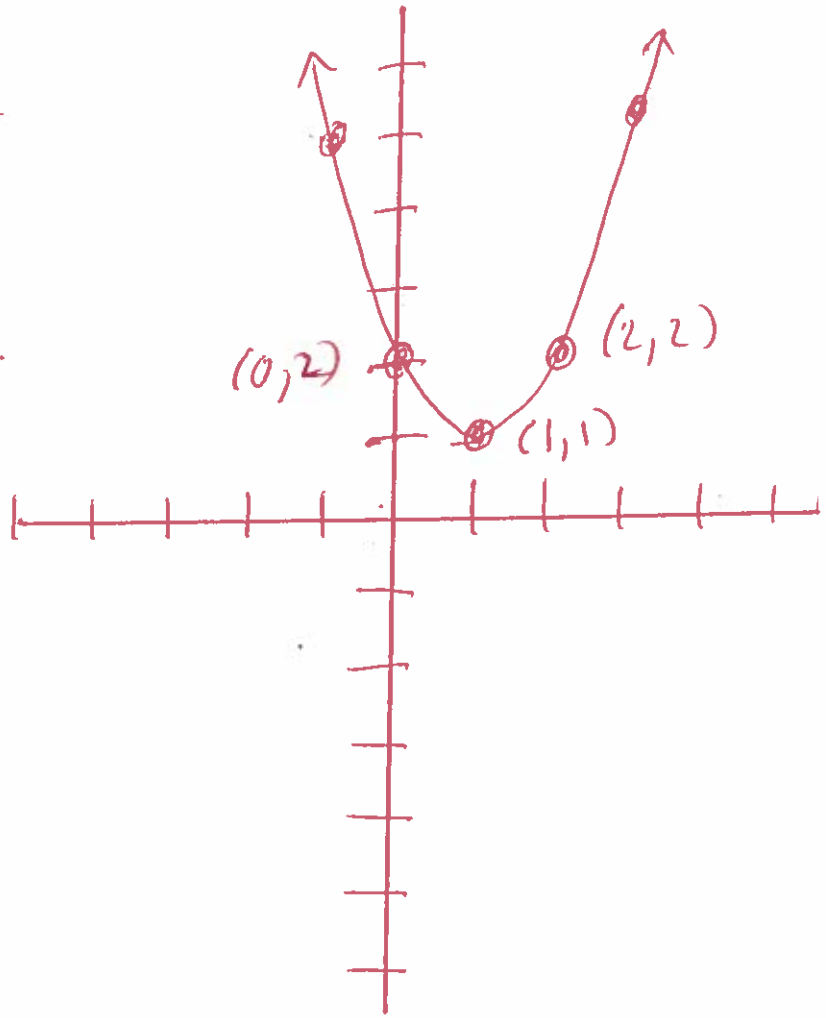
$f(2) = (2-1)^2 + 1$

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

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

$f(2) = 1 + 1$

$f(2) = 2$



(14) graph

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

Or use a graphing calculator

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

(14)

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

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

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

$f(-2) = 2 - 3$

$f(-2) = -1$

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

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

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

$f(-3) = 0 - 3$

$f(-3) = -3$

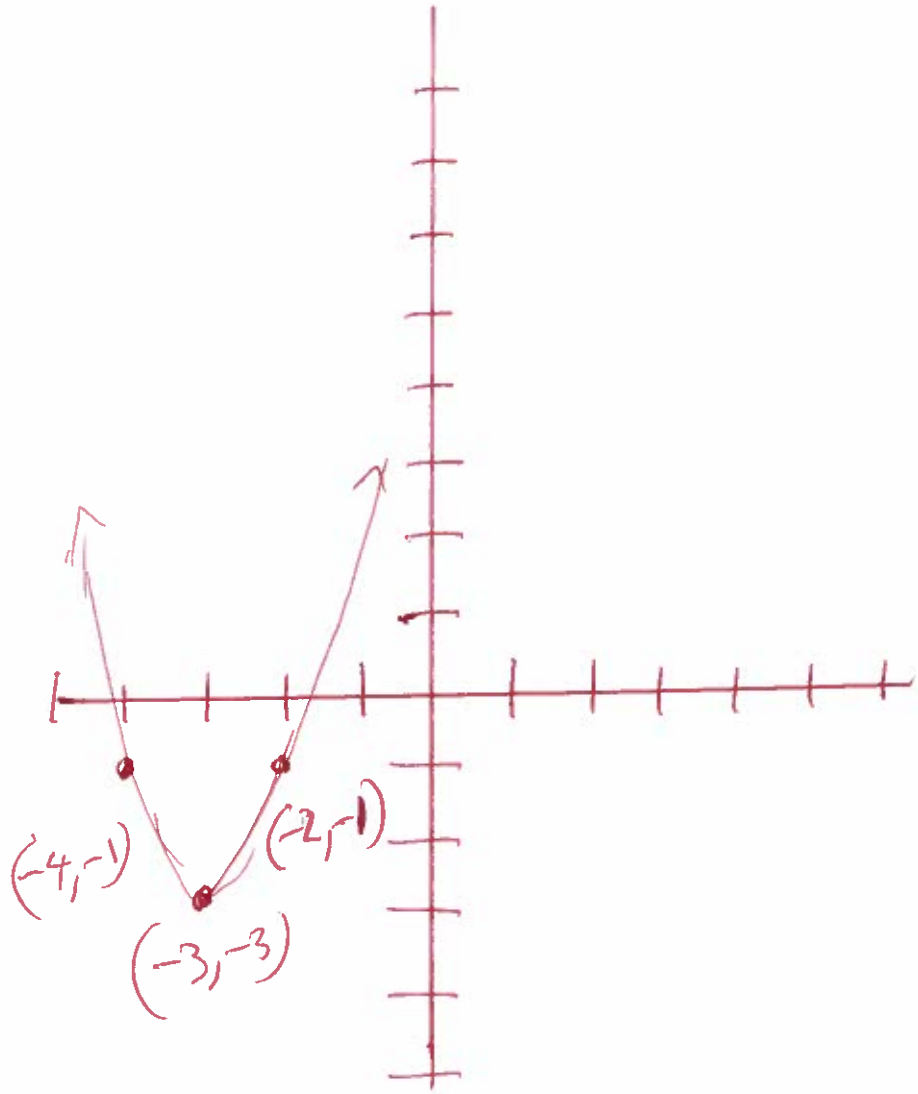
$f(-4) = 2(-4+3)^2 - 3$

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

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

$f(-4) = 2 - 3$

$f(-4) = -1$



(15.) graph

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

$f(-1) = (-1)^2 + 4(-1) - 5$

$f(-1) = (-1)(-1) + 4(-1) - 5$

$f(-1) = 1 - 4 - 5$

$f(-1) = -8$

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

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

$f(-2) = 4 - 8 - 5$

$f(-2) = -9$

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

$f(-3) = (-3)(-3) + 4(-3) - 5$

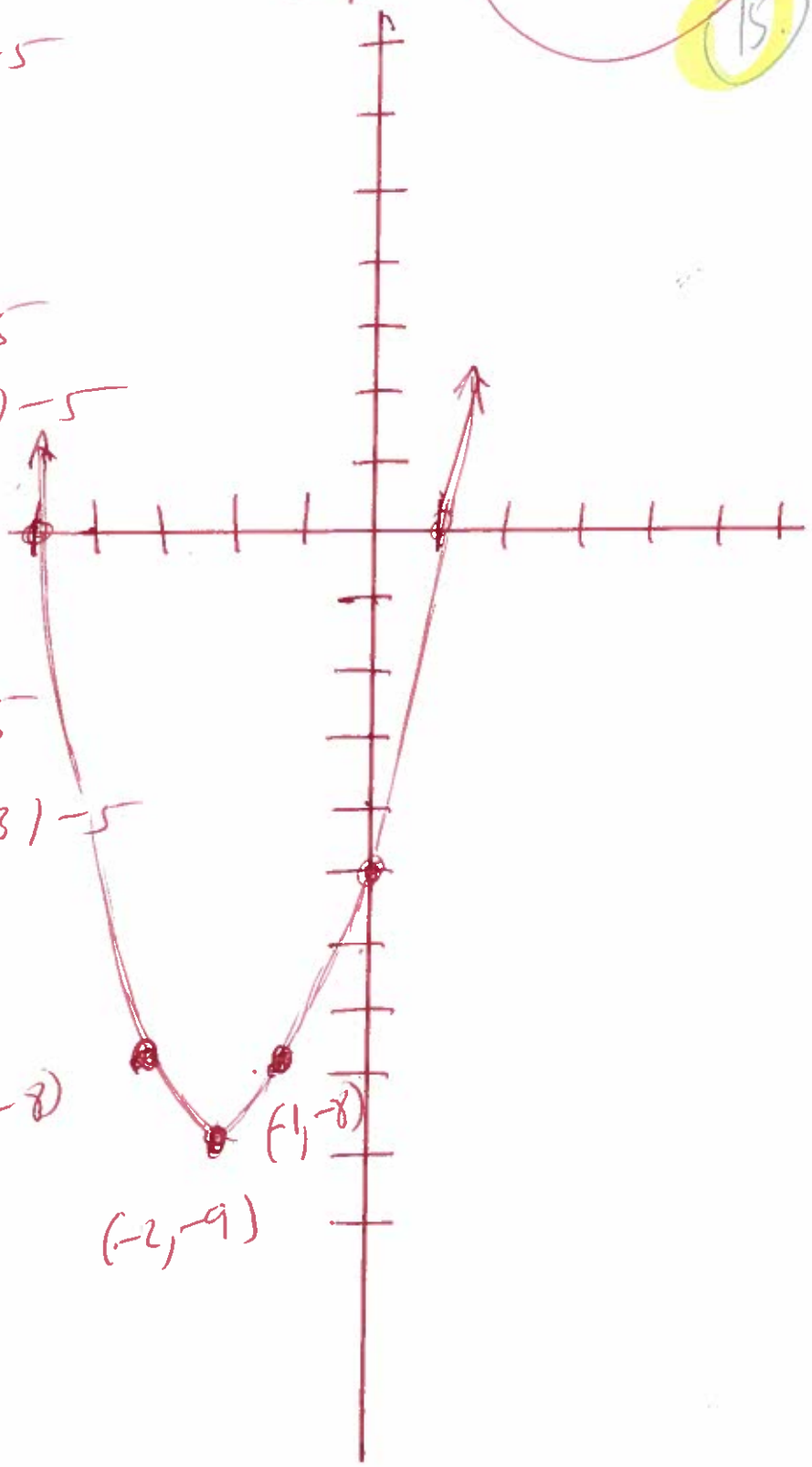
$f(-3) = 9 - 12 - 5$

$f(-3) = -8$

x	f(x)
-1	-8
-2	-9
-3	-8

OR use a graphing calculator

15.



(16) Graph

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

Or use a Graphing Calculator

x	f(x)
2	15
3	16
4	15

16.

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

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

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

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

$f(2) = 15$

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

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

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

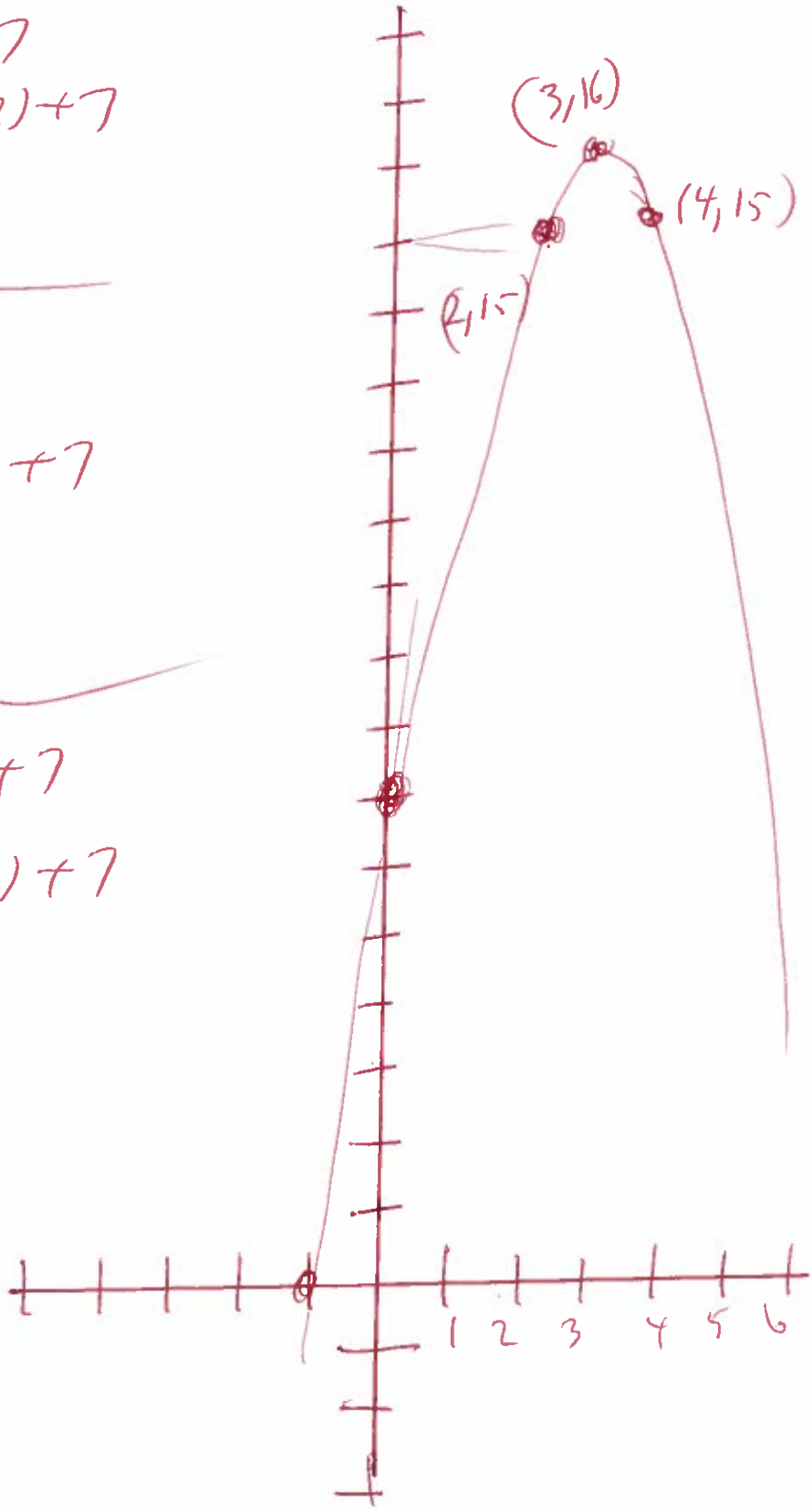
$f(3) = 16$

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

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

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

$f(4) = 15$



(17.) Solve the equation given that -1 is a zero.

$f(x) = x^3 - 5x^2 + 2x + 8$

$x^3 - 5x^2 + 2x + 8 = 0$

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

Use Synthetic division

$$\begin{array}{r|cccc} -1 & 1 & -5 & 2 & 8 \\ & & -1 & 6 & -8 \\ \hline & 1 & -6 & 8 & 0 \end{array}$$

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

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

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

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

$x = 2$ OR $x = 4$

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

(18) Find all the zeros

$f(x) = -x^3 - x^2 + 17x - 15$

$-x^3 - x^2 + 17x - 15 = 0$

18.

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

~~possible roots~~ rational

1) -1 | -1 $\quad 17 \quad -15$

$\quad\quad -1 \quad -2 \quad 15$

$-1 \quad -2 \quad 15 \quad (0)$ rem

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

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

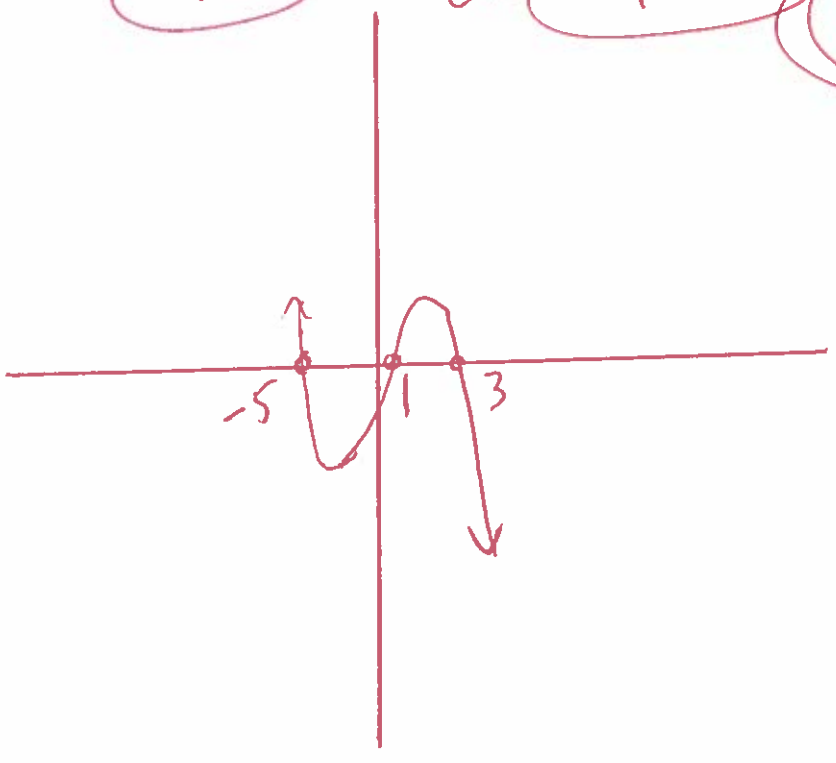
$x^2 + 2x - 15 = 0$

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

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

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

$x = 3$ OR $x = -5$ $\{1, 3, -5\}$



(19) Find the horizontal asymptote

19.

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

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

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

$$\lim_{x \to \infty} \frac{1}{3x} = 0$$

$y = 0$

20. Find the slant asymptote

20.

$$f(x) = \frac{3x^2 - 6x + 3}{x - 7}$$

use synthetic division

opp

$$\begin{array}{r|rrr} 7 & 3 & -6 & 3 \\ & & 21 & 105 \\ \hline & 3 & 15 & 108 \end{array}$$

rem

$$y = 3x + 15$$

(21) Find the vertical asymptote and the value of x corresponding to holes.

(21)

$$f(x) = \frac{x-1}{x^2-3x+2}$$

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

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

$x-1=0$ or $x-2=0$

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

$x=1$ or $x=2$

$x=1$ hole

Vertical asymptote

$$f(x) = \frac{x-1}{x^2-3x+2}$$

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

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

hole at $x-1=0$

$x-1+1=0+1$

$x=1$

(22.) Find the horizontal asymptote

$$f(x) = \frac{15x}{7x^2+6}$$

$$y = \text{Horiz Asym} = \frac{15x}{7x^2}$$

$$y = \frac{15}{7x}$$

$$\lim_{x \to \infty} \frac{15}{7x} = 0$$

$y = 0$ Horizontal Asymptote

(23.) Find the horizontal asymptote (23.)

$$g(x) = \frac{12x^2}{4x^3+7}$$

y = horizontal asymptote = $\frac{12x^2}{4x^3}$

$$y = \frac{12}{4}$$

$$y = 3$$

(24.) Find the domain

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

Let $8-x>0$

$8-x-8>0-8$

$-x>-8$

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

$x<8$

$(-\infty, 8)$

Formula

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

Let $Ax+B>0$

divide and turn the alligator around

(25) Expand

$$\log_b\left(\frac{x^2y}{z^7}\right) =$$

$$\log_b(x^2y) - \log_b(z^7) =$$

$$\log_b(x^2) + \log_b(y) - \log_b(z^7) =$$

$$2\log_b(x) + \log_b(y) - 7\log_b(z) =$$

(Formulas)

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

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

(26.) Expand

$$\ln\left(\frac{x^5\sqrt{x^2+6}}{(x+6)^7}\right) =$$

(26)

$$\ln\left(x^5\sqrt{x^2+6}\right) - \ln(x+6)^7 =$$

$$\ln(x^5) + \ln\sqrt{x^2+6} - \ln(x+6)^7 =$$

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

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

Formulas

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

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

(27.) Solve

$25^{x+9} = 625^{x-1}$

$(5^2)^{x+9} = (5^4)^{x-1}$

$5^{2x+18} = 5^{4x-4}$

$2x+18 = 4x-4$

$2x+18-18 = 4x-4-18$

$2x = 4x-22$

$2x-4x = 4x-22-4x$

$-2x = -22$

$\frac{-2x}{-2} = \frac{-22}{-2}$

$x = 11$

(28) Solve

$2^{x-1} = 437$

(28)

$\ln(2^{x-1}) = \ln(437)$

$(x-1)\ln(2) = \ln(437)$

$\frac{(x-1)\ln(2)}{\ln(2)} = \frac{\ln(437)}{\ln(2)}$

$x-1 = \frac{\ln(437)}{\ln(2)}$

$x-1+1 = \frac{\ln(437)}{\ln(2)} + 1$

$x = \frac{\ln(437)}{\ln(2)} + 1$ Exact Solution

or

$x = 9.771489447$

29. Solve

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

29

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

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

$6 = 5x^2 - x$

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

5.1 6.1 2,3

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

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

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

$5x = 6$ OR $x = -1$ BAD

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

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

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

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

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

Good!

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

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

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

$\log_6(-1) + \log_6$

$\{\frac{6}{5}\}$ answer

(30.) Solve

$\log_5(x+117)+\log_5(x+17)=5$

$\log_5(x+117)(x+17)=5$

$5^5=(x+117)(x+17)$

$3125=x^2+17x+117x+1989$

$3125=x^2+134x+1989$

$0=x^2+134x+1989-3125$

$0=x^2+134x-1136$

$0=(x-8)(x+142)$

$x-8=0$ or $x+142=0$

$x-8+8=0+8$ or $x+142-142=0-142$

$x=8$ or $x=-142$ BAD

Good

Ck

$\log_5(8+117)+\log_5(8+17)=5$

$\log_5(125)+\log_5(25)=5$ Good

Good Good

Ck

$\log_5(-142+117)+\log_5(-142+17)=5$ answer

$\log_5(-25)+\log_5(-125)=5$

BAD BAD

{8}

(31.) Solve

$\log_5(x+14) - \log_5(x-10) = 2$

$\log_5\left(\frac{x+14}{x-10}\right) = 2$

31.

$5^2 = \frac{x+14}{x-10}$

$25 = \frac{x+14}{x-10}$

$\frac{25}{1} = \frac{x+14}{x-10}$

$25(x-10) = 1(x+14)$

$25x - 250 = 1x + 14$

$25x - 250 + 250 = 1x + 14 + 250$

$25x = 1x + 264$

$25x - 1x = 1x + 264 - 1x$

$24x = 264$

$\frac{24x}{24} = \frac{264}{24}$

$x = 11$ Good

$\log_5(11+14) - \log_5(11-10) = 2$

$\log_5(25) - \log_5(1) = 2$

Good Good

{11}

(32) Solve

$\log(x) + \log(x+5) = \log(6)$

$\log(x)(x+5) = \log(6)$

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

$x^2 + 5x = 6$

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

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

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

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

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

$x=1$ Good

$x=-6$ BAD

Ck

$\log(1) + \log(1+5) = \log(6)$

$\log(1) + \log(6) = \log(6)$

Good Good Good

Ck

$\log(-6) + \log(-6+5) = \log(6)$

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

BAD BAD

{1}

(33)

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

$A = 19000$
$P = 12500$
$r = 4.75\% = .0475$
$n = 2$
$t = ?$

$19000 = 12500\left(1+\frac{.0475}{2}\right)^{2t}$

$\frac{19000}{12500} = \frac{12500\left(1+\frac{.0475}{2}\right)^{2t}}{12500}$

$1.52 = \left(1+\frac{.0475}{2}\right)^{2t}$

$1.52 = (1+.02375)^{2t}$

$1.52 = (1.02375)^{2t}$

$\ln(1.52) = \ln(1.02375)^{2t}$

$\ln(1.52) = 2t\ln(1.02375)$

$\frac{\ln(1.52)}{\ln(1.02375)} = \frac{2t\ln(1.02375)}{\ln(1.02375)}$

$\frac{\ln(1.52)}{\ln(1.02375)} = 2t$

$\frac{1}{2}\cdot\frac{\ln(1.52)}{\ln(1.02375)} = \frac{1}{2}(2t)$

$\frac{\ln(1.52)}{2\ln(1.02375)} = t$

$8.919222501 = t$

$(\ln(1.52)) \div (2\ln(1.02375)) = t$

34.

Solve

$$1017 = 916.1e^{0.026t}$$

$$\frac{1017}{916.1} = \frac{916.1e^{0.026t}}{916.1}$$

$$1.110140814 = e^{0.026t}$$

$$\ln(1.110140814) = \ln e^{0.026t}$$

$$\ln(1.110140814) = 0.026t \ln(e)$$

$$\ln(1.110140814) = 0.026t(1)$$

$$\ln(1.110140814) = 0.026t$$

$$\frac{\ln(1.110140814)}{0.026} = \frac{0.026t}{0.026}$$

$$4.018725644 = t \leftarrow \text{YEARS Later}$$

Start Year 2003 ← Original

Add $2003 + 4.018725644$

2007.018726 ← Ends

Use a graphing Calculator

35. Evaluate if $t = 9314$

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

$$A = 16e^{(-0.000121(9314))}$$

$$A = 5.184092085$$

Use a graphing calculator

(36.) Solve

$25 = 100e^{-0.000121t}$

$\frac{25}{100} = \frac{100e^{-0.000121t}}{100}$

$.25 = e^{-0.000121t}$

$\ln(.25) = \ln(e^{-0.000121t})$

$\ln(.25) = -0.000121t \ln(e)$

$\ln(.25) = -0.000121t(1)$

$\ln(.25) = -0.000121t$

$\frac{\ln(.25)}{-0.000121} = \frac{-0.000121t}{-0.000121}$

$11456.97819 = t$

OR Round to 2

$11457 = t$

Use a graphing Calculator

(37.) Solve

$10 = 5e^{0.004t}$

$\frac{10}{5} = \frac{5e^{0.004t}}{5}$

$2 = e^{0.004t}$

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

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

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

$\ln(2) = 0.004t$

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

$173.2867951 = t$

use a graphing calculator

(38) Solve

$x+y+4z=5$

$x+y+8z=13$

$x-3y+9z=35$

Use graphing calculator (50)

2ND Matrix

Edit [A]

3 X 4

$$[A]=\begin{bmatrix} 1 & 1 & 4 & 5 \\ 1 & 1 & 8 & 13 \\ 1 & -3 & 9 & 35 \end{bmatrix}$$

2ND Quit

2ND matrix math rref

rref([A]) =

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

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

39. Evaluate

$$\sum_{x=1}^{3} x(x+4)$$

Use graphing calculator

Math

Summation Σ

38

$$\sum_{x=1}^{3} x(x+4) =$$

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

$1(5) + 2(6) + 3(7) =$

$5 + 12 + 21 =$

38 =

(40.) Use the Binomial Theorem to expand $(x+10)^3 =$

40

$${}_3C_0(x)^3(10)^0 + {}_3C_1(x)^2(10)^1 + {}_3C_2(x)^1(10)^2 + {}_3C_3(x)^0(10)^3 =$$

$$(1)(x^3)(1)+(3)(x^2)(10)+(3)(x)(100)+(1)(1)(1000) =$$

$$\boxed{x^3 + 30x^2 + 300x + 1000 =}$$

use a graphing calculator

(41) Use the Binomial Theorem to expand

$(3x+y)^3$

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

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

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

$$27x^3 + 27x^2y + 9xy^2 + y^3 =$$

Use a graphing Calculator

(42.) Expand use Binomial Theorem

$(3x-2)^3$

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

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

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

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

use a graphing Calculator

(43) Write the first three terms

$(x+2)^9 =$

Use Binomial theorem

$\binom{9}{0}(x)(2)^0 + \binom{9}{1}(x)^8(2)^1 + \binom{9}{2}(x)^7(2)^2 =$

$(1)(x^9)(1) + (9)(x^8)(2) + (36)(x^7)(4) =$

$x^9 + 18x^8 + 144x^7 =$

Use a graphing Calculator

(44.) Write the first three terms use Binomial theorem.

44

$(x-3y)^7 =$

$$\binom{7}{0}(x)^7(-3y)^0 + \binom{7}{1}(x)^6(-3y)^1 + \binom{7}{2}(x)^5(-3y)^2 =$$

$$(1)(x^7)(1) + (7)(x^6)(-3y) + (21)(x^5)(-3y)(-3y) =$$

$$(1)(x^7)(1) + (7)(x^6)(-3y) + (21)(x^5)(9y^2) =$$

$$x^7 - 21x^6y + 189x^5y^2 =$$