

Question #1

a.)  $2x^2 - 5x - 3 = 0$   
 $(2x + 1)(x - 3) = 0$   
 $2x + 1 = 0$  or  $x - 3 = 0$   
 $x = -\frac{1}{2}$  or  $x = 3$

b.)  $x(x + 4) = 12$   
 $x^2 + 4x = 12$   
 $x^2 + 4x - 12 = 0$   
 $(x + 6)(x - 2) = 0$   
 $x + 6 = 0$  or  $x - 2 = 0$   
 $x = -6$  or  $x = 2$

c.)  $(2x + 3)^2 = 9$   
 $\sqrt{(2x + 3)^2} = \sqrt{9}$   
 $2x + 3 = \pm 3$   
 $2x + 3 = 3$  or  $2x + 3 = -3$   
 $2x = 0$  or  $2x = -6$   
 $x = 0$  or  $x = -3$

d.)  $x^2 - 6x = 13$   
 $x^2 - 6x + 9 = 13 + 9$   
 $\downarrow \quad \uparrow$   
 $-\frac{6}{2} \rightarrow (-3)^2$   
 $(x - 3)^2 = 22$   
 $\sqrt{(x - 3)^2} = \sqrt{22}$   
 $x - 3 = \pm \sqrt{22}$   
 $x = 3 \pm \sqrt{22}$

e.)  $x^2 + \frac{2}{3}x - \frac{1}{3} = 0$   
 LCD = 3  
 $3(x^2 + \frac{2}{3}x - \frac{1}{3}) = (0) \cdot 3$   
 $3x^2 + 2x - 1 = 0$   
 $(3x - 1)(x + 1) = 0$   
 $3x - 1 = 0$  or  $x + 1 = 0$   
 $x = \frac{1}{3}$  or  $x = -1$

f.)  $4x^2 + x + 1 = 0$   
 $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(4)(1)}}{2(4)}$   
 $= \frac{1 \pm \sqrt{1 - 16}}{8}$   
 $= \frac{1 \pm \sqrt{-15}}{8}$   
 $= \frac{1 \pm i\sqrt{15}}{8}$   
 $x = \frac{1}{8} \pm \frac{i\sqrt{15}}{8}$

g.)  $3x = 1 - \frac{1}{x}$   
 LCD = x  
 $x(3x) = x(1 - \frac{1}{x})$   
 $3x^2 = x - 1$   
 $3x^2 - x + 1 = 0$   
 $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(1)}}{2(3)}$   
 $= \frac{1 \pm \sqrt{1 - 12}}{6}$   
 $= \frac{1 \pm \sqrt{-11}}{6} = \frac{1 \pm i\sqrt{11}}{6}$   
 $x = \frac{1}{6} \pm \frac{i\sqrt{11}}{6}$

Question #2

a.)  $\sqrt{5t + 3} = 2$   
 $(\sqrt{5t + 3})^2 = (2)^2$   
 $5t + 3 = 4$   
 $5t = 1$   
 $t = \frac{1}{5}$

check:  
 $\sqrt{5(\frac{1}{5}) + 3} \stackrel{?}{=} 2$   
 $\sqrt{1 + 3} \stackrel{?}{=} 2$   
 $\sqrt{4} \stackrel{?}{=} 2$   
 $2 = 2 \checkmark$   
 $t = \frac{1}{5}$

b.)  $x = 2\sqrt{x - 1}$   
 $(x)^2 = (2\sqrt{x - 1})^2$   
 $x^2 = 4(x - 1)$   
 $x^2 = 4x - 4$   
 $x^2 - 4x + 4 = 0$   
 $(x - 2)^2 = 0$   
 $\sqrt{(x - 2)^2} = \sqrt{0}$   
 $x - 2 = 0$   
 $x = 2$

check:  
 $2 \stackrel{?}{=} 2\sqrt{2 - 1}$   
 $2 \stackrel{?}{=} 2\sqrt{1}$   
 $2 = 2 \checkmark$   
 $x = 2$

Question #2 continued

c.)  $\sqrt{3-x+x^2} = x-2$   
 $(\sqrt{3-x+x^2})^2 = (x-2)^2$   
 $3-x+x^2 = x^2 - 4x + 4$   
 $3-x+x^2-x^2+4x-4=0$   
 $3x-1=0$   
 $3x=1$   
 $x=1/3$

check:

$\sqrt{3-\frac{1}{3}+(\frac{1}{3})^2} \stackrel{?}{=} \frac{1}{3}-2$

$\sqrt{3-\frac{1}{3}+\frac{1}{9}} \neq -\frac{5}{3}$

No solution

d.)  $2+\sqrt{12-2x} = x$   
 $\sqrt{12-2x} = x-2$   
 $(\sqrt{12-2x})^2 = (x-2)^2$   
 $12-2x = x^2 - 4x + 4$   
 $0 = x^2 - 2x - 8$   
 $0 = (x-4)(x+2)$   
 $x-4=0$  OR  $x+2=0$   
 $x=4$        $x=-2$

check  
 $x=4: 2+\sqrt{12-2(4)} \stackrel{?}{=} 4$   
 $2+\sqrt{12-8} \stackrel{?}{=} 4$   
 $2+\sqrt{4} \stackrel{?}{=} 4$   
 $2+2 \stackrel{?}{=} 4$   
 $4=4 \checkmark$

$x=-2: 2+\sqrt{12-2(-2)} \stackrel{?}{=} -2$   
 $2+\sqrt{12+4} \stackrel{?}{=} -2$   
 $2+\sqrt{16} \stackrel{?}{=} -2$   
 $2+4 \stackrel{?}{=} -2$   
 $6 \neq -2$

x=4

e.)  $x^4 - 10x^2 + 25 = 0$   
 $u = x^2$   
 $u^2 = x^4$

$u^2 - 10u + 25 = 0$   
 $(u-5)^2 = 0$   
 $(x^2-5)^2 = 0$   
 $\sqrt{(x^2-5)^2} = \sqrt{0}$

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

$\sqrt{x^2} = \sqrt{5}$   
 $x = \pm\sqrt{5}$

f.)  $x^6 + 7x^3 - 8 = 0$

$u = x^3$   
 $u^2 = x^6$

$u^2 + 7u - 8 = 0$   
 $(u+8)(u-1) = 0$   
 $(x^3+8)(x^3-1) = 0$

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

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

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

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

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

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

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

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

$x = \frac{-1 \pm \sqrt{-3}}{2}$

$x = \frac{-1 \pm i\sqrt{3}}{2}$

$x=-2$  OR  $x=1 \pm i$  OR  $x=1$  OR  $x = \frac{-1 \pm i\sqrt{3}}{2}$

Question #2 continued

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

$u = x+1$

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

$2u^2 - 5u = 3$

$2u^2 - 5u - 3 = 0$

$(2u+1)(u-3) = 0$

$2u+1=0$  or  $u-3=0$

$2(x+1)+1=0$        $(x+1)-3=0$

$2x+2+1=0$        $x-2=0$

$2x+3=0$

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

h.)  $t^{1/2} - 2t^{1/4} + 1 = 0$

$u = t^{1/4}$

$u^2 = t^{1/2}$

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

$(u-1)(u-1) = 0$

$(t^{1/4} - 1)^2 = 0$

$t^{1/4} - 1 = 0$

$t^{1/4} = 1$

$(t^{1/4})^4 = (1)^4$

$t = 1$

Check:

$(1)^{1/2} - 2(1)^{1/4} + 1 \stackrel{?}{=} 0$

$1 - 2 + 1 \stackrel{?}{=} 0$

$0 = 0$

$t = 1$

i.)  $\frac{1}{(x-1)^2} + \frac{1}{x-1} = 12$

LCD =  $(x-1)^2$

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

$1 + (x-1) = 12(x^2 - 2x + 1)$

$x = 12x^2 - 24x + 12$

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

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

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

$x = 4/3$  or  $x = 3/4$

j.)  $\frac{8}{x^2-9} + \frac{4}{x+3} = \frac{2}{x-3}$

LCD =  $(x+3)(x-3)$  Restricted value:  $x \neq 3, -3$

$(\frac{8}{(x+3)(x-3)})(x+3)(x-3) + (\frac{4}{x+3})(x+3)(x-3) = (\frac{2}{x-3})(x+3)(x-3)$

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

$8 + 4x - 12 = 2x + 6$

$4x - 4 = 2x + 6$

$4x - 2x = 6 + 4$

$2x = 10$

$x = 5$

k.)  $\frac{1}{x-2} + \frac{1}{x+2} = \frac{4}{x^2-4}$

LCD =  $(x-2)(x+2)$  Restricted value:  $x \neq 2, -2$

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

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

$x+2 + x-2 = 4$

$2x = 4$

$x = 2$  ← Restricted value

$\emptyset$

Question #2 continued

$$e) \frac{2x-1}{x^2+2x-8} + \frac{2}{x+4} = \frac{1}{x-2}$$

LCD = (x+4)(x-2) Restricted values: x = -4, 2

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

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

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

$$4x-5 = x+4$$

$$4x-x = 4+5$$

$$3x = 9$$

$$\boxed{x = 3}$$

Question #3

a)  $3x-1 \geq 3+x$

$$3x-x \geq 3+1$$

$$2x \geq 4$$

$$x \geq 2$$

$$\boxed{[2, \infty)}$$

b)  $8-4(2-x) \leq -2x$

$$8-8+4x \leq -2x$$

$$4x \leq -2x$$

$$4x+2x \leq 0$$

$$6x \leq 0$$

$$x \leq 0$$

$$\boxed{(-\infty, 0]}$$

c)  $3x+4 > \frac{1}{3}(x-2)$

$$3x+4 > \frac{1}{3}x - \frac{2}{3}$$

LCD = 3

$$3(3x)+3(4) > 3\left(\frac{1}{3}x\right)-3\left(\frac{2}{3}\right)$$

$$9x+12 > x-2$$

$$9x-x > -2-12$$

$$8x > -14$$

$$x > -\frac{7}{4} \quad \boxed{\left(-\frac{7}{4}, \infty\right)}$$

d)  $4 \leq 2x+2 \leq 10$

$$4-2 \leq 2x \leq 10-2$$

$$2 \leq 2x \leq 8$$

$$1 \leq x \leq 4$$

$$\boxed{[1, 4]}$$

e)  $0 < 1 - \frac{1}{3}x < 1$

$$0-1 < -\frac{1}{3}x < 1-1$$

$$-1 < -\frac{1}{3}x < 0$$

$$\frac{-1}{-\frac{1}{3}} \quad \frac{-1}{-\frac{1}{3}} \quad \frac{0}{-\frac{1}{3}}$$

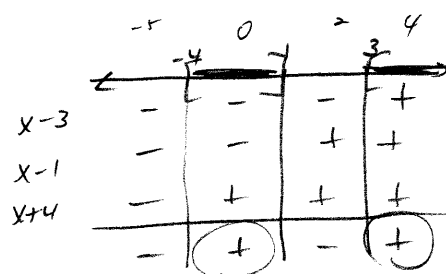
$$3 > x > 0$$

$$0 < x < 3$$

$$\boxed{(0, 3)}$$

f)  $\frac{x^2-4x+3}{x+4} \geq 0$

$$\frac{(x-3)(x-1)}{x+4} \geq 0$$

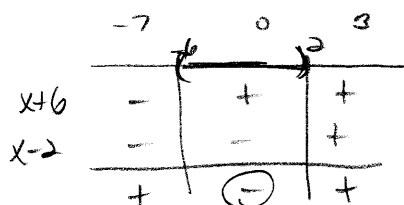


$$\boxed{[-4, 1] \cup [3, \infty)}$$

g)  $x^2+4x < 12$

$$x^2+4x-12 < 0$$

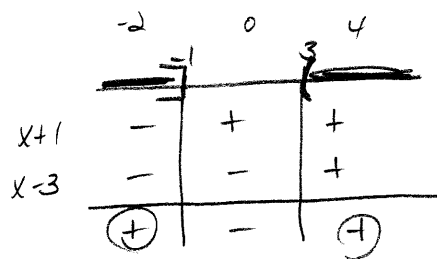
$$(x+6)(x-2) < 0$$



$$\boxed{(-6, 2)}$$

Question #3 continued

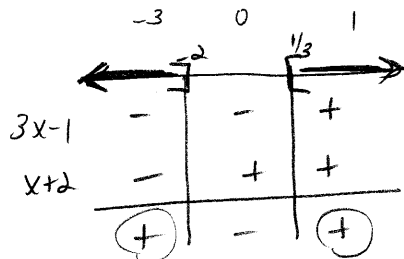
h.)  $\frac{x+1}{x-3} \geq 0$



$[-\infty, -1] \cup (3, \infty)$

i.)  $3x^2 + 5x - 2 \geq 0$

$(3x-1)(x+2) \geq 0$



$[-\infty, -2] \cup [1/3, \infty)$

Question #4

a.)  $y = -3x + 4$

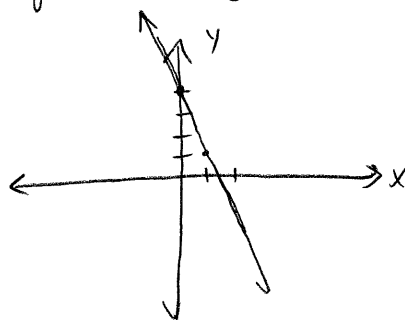
x-intercept:  $0 = -3x + 4$

$-4 = -3x$

$x = 4/3$   $(4/3, 0)$

y-intercept  $(0, 4)$

slope:  $m = -3$



b.)  $\frac{1}{3}x + y = 2$

x-intercept  $\frac{1}{3}x + 0 = 2$

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

$x = 6$

$(6, 0)$

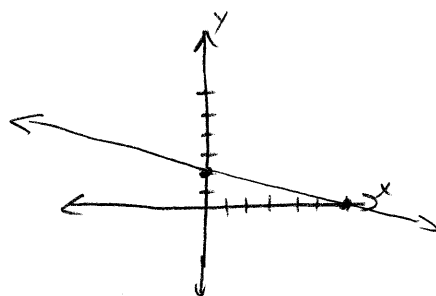
y-intercept  $\frac{1}{3}(0) + y = 2$

$y = 2$

$(0, 2)$

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

$m = -1/3$



c.)  $x + 2y = 4$

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

$(4, 0)$

$x = 4$

y-intercept  $(0) + 2y = 4$

$2y = 4$

$(0, 2)$

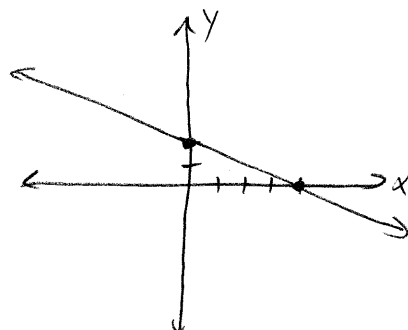
$y = 2$

slope:  $x + 2y = 4$

$2y = -x + 4$

$m = -1/2$

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



d.)  $3x + 2y = 6$

x-intercept  $3x + 2(0) = 6$

$3x = 6$

$x = 2$

$(2, 0)$

y-intercept  $3(0) + 2y = 6$

$2y = 6$

$y = 3$

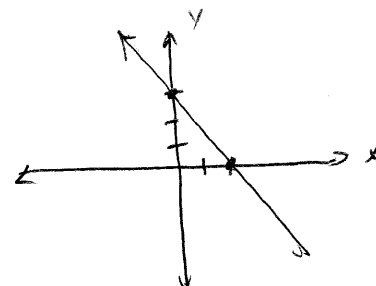
$(0, 3)$

slope:  $3x + 2y = 6$

$2y = -3x + 6$

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

$m = -3/2$

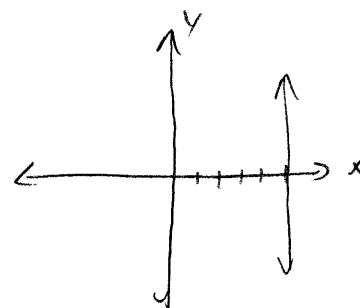


e.)  $x = 5$  vertical line

x-intercept  $(5, 0)$

y-intercept None

slope undefined



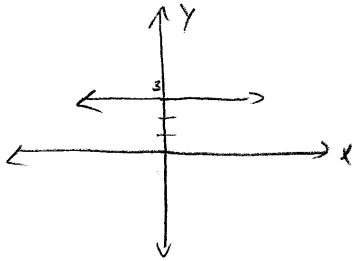
Question #4 continued

f.)  $y = 3$  horizontal line

x-intercept None

y-intercept (0,3)

slope = 0



g.)  $x - y = 2$

x-intercept:  $x - 0 = 2$

(2,0)  $x = 2$

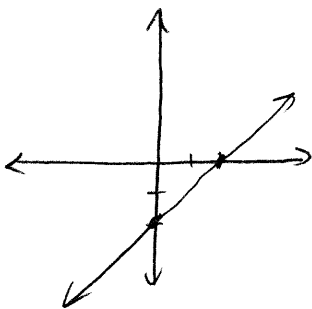
y-intercept  $0 - y = 2$

(0,-2)  $-y = 2$   
 $y = -2$

slope:  $-y = -x + 2$

$y = x - 2$

$m = 1$



Question #5

a.)  $m = -2/3$  (1,-1)

$y - (-1) = -2/3(x - 1)$

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

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

$y = -2/3x - 1/3$

b.) (-3,4) (2,5)

$m = \frac{5-4}{2-(-3)} = \frac{1}{5}$

$y - 4 = \frac{1}{5}(x - (-3))$

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

$y = \frac{1}{5}x + \frac{3}{5} + \frac{4}{1}$

$y = \frac{1}{5}x + \frac{23}{5}$

c.)  $m = -2$ , (0,-2)

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

$y + 2 = -2x$

$y = -2x - 2$

d.)  $m = \text{undefined}$  (2,4)

$x = 2$

Question #6

a.)  $y = \frac{1}{x}$  Function

b.)  $y^2 = 4 - x^2$

$y = \pm \sqrt{4 - x^2}$  Not a function

c.)  $y = |x|$  Function

d.)  $y = \frac{3x-1}{x+2}$  Function

Question #7

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

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

$f(2) = (2)^2 + 2(2) + 3 = 11$

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

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

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

$= x^2 + 4x + 6$

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

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

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

$= x^2 + 2xh + h^2 + 2x + 2h + 3$

b.)  $f(x) = |x| + 4$

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

$f(2) = |2| + 4 = 6$

$f(a) = |a| + 4$

$f(x+1) = |x+1| + 4$

$f(2x) = |2x| + 4 = 2|x| + 4$

$f(x+h) = |x+h| + 4$

Question #7 continued

c)  $f(x) = \frac{2x+1}{3x-5}$

$f(0) = \frac{2(0)+1}{3(0)-5} = -\frac{1}{5}$

$f(2) = \frac{2(2)+1}{3(2)-5} = \frac{5}{1} = 5$

$f(a) = \frac{2a+1}{3a-5}$

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

$f(2x) = \frac{2(2x)+1}{3(2x)-5} = \frac{4x+1}{6x-5}$

$f(x+h) = \frac{2(x+h)+1}{3(x+h)-5} = \frac{2x+2h+1}{3x+3h-5}$

Question #8

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

Domain  $(-\infty, \infty)$

b.)  $f(x) = \frac{4x}{x^2 - 3x + 2}$

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

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

$x = 1, 2$

$\{x \mid x \neq 1, 2\}$

c.)  $f(x) = \sqrt{5x-3}$

$5x-3 \geq 0$

$5x \geq 3$

$x \geq 3/5$

$\boxed{[3/5, \infty)}$

d.)  $f(x) = \frac{3}{\sqrt{3x-7}}$

$3x-7 > 0$

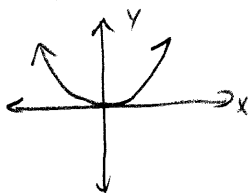
$3x > 7$

$x > 7/3$

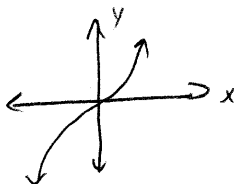
$\boxed{(7/3, \infty)}$

Question #9

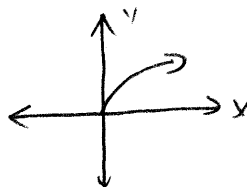
a.)  $f(x) = x^2$



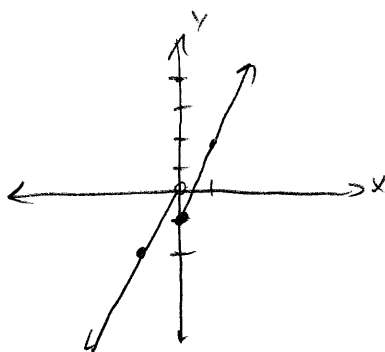
b.)  $f(x) = x^3$



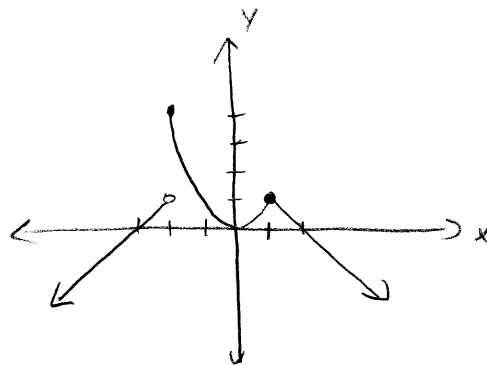
c.)  $f(x) = \sqrt{x}$



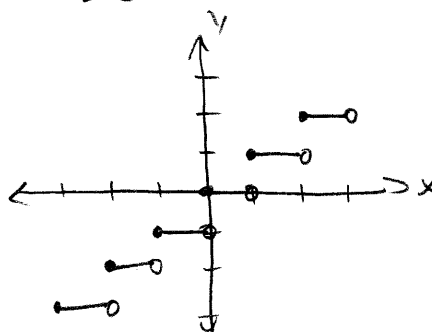
d.)  $f(x) = \begin{cases} 2x & x < 0 \\ 3x-1 & x \geq 0 \end{cases}$



e.)  $f(x) = \begin{cases} x+3 & x < -2 \\ x^2 & -2 \leq x < 1 \\ -x+2 & x > 1 \end{cases}$



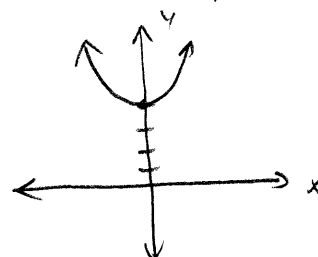
$f(x) = \lfloor x \rfloor$



Question #10

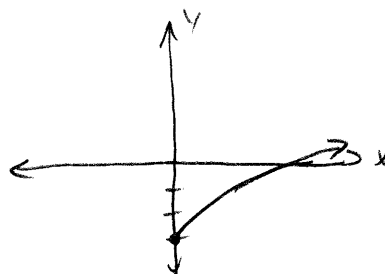
a.)  $f(x) = x^2 + 4$

shift 4 units up



b.)  $f(x) = \sqrt{x} - 3$

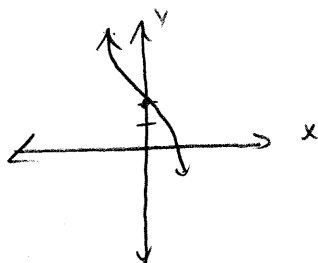
shift 3 units down



Question #10 continued

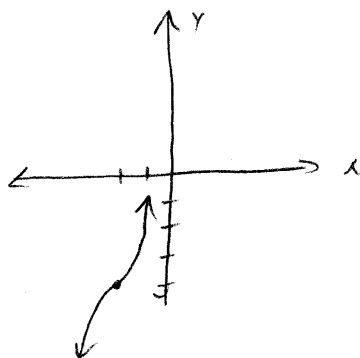
c.)  $f(x) = -x^3 + 2$

vertical reflection  
shift 2 units up



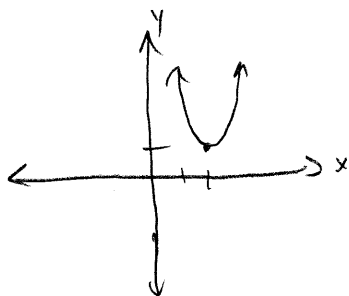
d.)  $f(x) = (x+2)^3 - 4$

shift 2 units left  
shift 4 units down



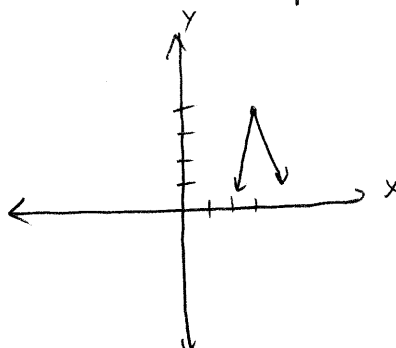
e.)  $f(x) = 3(x-2)^2 + 1$

stretch by a factor of 3  
shift 2 units right  
shift 1 unit up



f.)  $f(x) = -2|x-3| + 4$

vertical reflection  
stretch by factor of 2  
shift 3 units right  
shift 4 units up



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

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

$$= x^2 - 9x + 20$$

12(e-m) Not on Exam #1

Question #13

$(0, 32)$      $(100, 212)$

$C_1, F_1$      $C_2, F_2$

$$m = \frac{F_2 - F_1}{C_2 - C_1} = \frac{212 - 32}{100 - 0} = \frac{180}{100} = \frac{9}{5}$$

$$F - F_1 = m(C - C_1)$$

$$F - 32 = \frac{9}{5}(C - 0)$$

$$F - 32 = \frac{9}{5}C$$

$$F = \frac{9}{5}C + 32$$

If  $F = 70$

$$70 = \frac{9}{5}C + 32$$

$$38 = \frac{9}{5}C$$

$$C = \frac{190}{9} = 21\frac{1}{9}^\circ C$$

Question #11

a.)  $y = x^3 + 4$

b.)  $y = (x-3)^3$

c.)  $y = -(x+2)^3 + 3$

Question #12

a.)  $(f+h)(x) = f(x) + h(x)$   
 $= (x^2 - 3x + 2) + (-4x + 5)$   
 $= x^2 - 7x + 7$

b.)  $(f-h)(2) = f(2) - h(2)$   
 $= 0 - (-3) = 3$

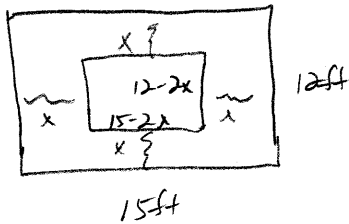
$$f(2) = (2)^2 - 3(2) + 2 = 0$$

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

c.)  $(\frac{f}{h})(x) = \frac{f(x)}{h(x)}$   
 $= \frac{x^2 - 3x + 2}{-4x + 5}$



Question #14



$A = lw$

$108 = (15 - 2x)(12 - 2x)$

$108 = 180 - 54x + 4x^2$

$0 = 4x^2 - 54x + 72$

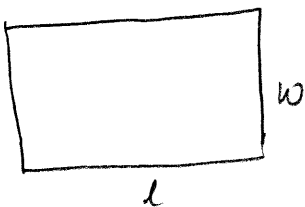
$0 = 2(2x^2 - 27x + 36)$

$0 = 2(2x - 3)(x - 12)$

$2 = 0$  OR  $2x - 3 = 0$  OR  $x - 12 = 0$

$x = \frac{3}{2}$        $x = 12$   
 ↑                      ↑  
 Applicable      Not applicable  
 $15 - 2(\frac{3}{2}) = 15 - 3 = 12$  ft  
 $12 - 2(\frac{3}{2}) = 12 - 3 = 9$  ft

Question #15



$P = 2l + 2w = 300$

$A = lw = 5000$

$2l = 300 - 2w$

$l = 150 - w$

$(150 - w)w = 5000$

$150w - w^2 = 5000$

$0 = w^2 - 150w + 5000$

$0 = (w - 100)(w - 50)$

$w = 100, w = 50$

$l = 50 \quad l = 100$

**100 m by 50 m**

Question #16

value x quantity = amount

0.50      x      0.50x

0.20      80      16

0.40      y      0.40y

$x + 80 = y$

$0.5x + 16 = 0.4y$

$0.5x + 16 = 0.4(x + 80)$

$0.5x + 16 = 0.4x + 32$

$0.5x - 0.4x = 32 - 16$

$0.1x = 16$

$x = 160$  gallons

Question #17

value x quantity = amount

0.25      x      0.25x

0.10      y      0.10y

0.19      20      3.8

$x + y = 20$

$y = 20 - x$

$0.25x + 0.10y = 3.8$

$0.25x + 0.1(20 - x) = 3.8$

$0.25x + 2 - 0.1x = 3.8$

$0.15x + 2 = 3.8$

$0.15x = 3.8 - 2$

$0.15x = 1.8$

$x = 12$

$y = 20 - 12 = 8$

**12 lbs of the 25% mixture and 8 lbs of the 10% mixture**

Question #18

value  $\times$  quantity = amount

1.00	x	1x
0.15	20	3
0.25	y	0.25y

$$x + 20 = y$$

$$x + 3 = 0.25y$$

$$x + 3 = 0.25(x + 20)$$

$$x + 3 = 0.25x + 5$$

$$x - 0.25x = 5 - 3$$

$$0.75x = 2$$

$$x = \boxed{2\frac{2}{3} \text{ gallons of } 100\%}$$

Question #19

rate  $\times$  time = job

Doug  $\frac{1}{7} \quad t \quad \frac{1}{7}t$

Scott  $\frac{1}{12} \quad t \quad \frac{1}{12}t$

$$\frac{1}{7}t + \frac{1}{12}t = 1$$

$$\text{LCD} = 84$$

$$84\left(\frac{1}{7}t\right) + 84\left(\frac{1}{12}t\right) = 84(1)$$

$$12t + 7t = 84$$

$$19t = 84$$

$$t = \frac{84}{19} = \boxed{4\frac{8}{19} \text{ hrs}}$$

Question #20

rate  $\times$  time = job

Jorge  $\frac{1}{8} \quad t \quad \frac{1}{8}t$

Caterina  $\frac{1}{6} \quad t \quad \frac{1}{6}t$

$$\frac{1}{8}t + \frac{1}{6}t = 1 \quad \text{LCD} = 24$$

$$24\left(\frac{1}{8}t\right) + 24\left(\frac{1}{6}t\right) = 24(1)$$

$$3t + 4t = 24 \quad t = \frac{24}{7} = \boxed{3\frac{3}{7} \text{ hrs}}$$

$$7t = 24$$

Question #21

rate  $\times$  time = job

x hrs	Experienced	$\frac{1}{x}$	2	$\frac{2}{x}$
2x hrs	New	$\frac{1}{2x}$	2	$\frac{1}{x}$

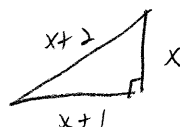
$$\frac{2}{x} + \frac{1}{x} = 1 \quad \text{LCD} = x$$

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

$$2 + 1 = x$$

$x = 3$  hrs for the experienced employee  
 $6$  hrs for the new employee

Question #22



$$1^{\text{st}} = x$$

$$2^{\text{nd}} = x+1$$

$$3^{\text{rd}} = x+2$$

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

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

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

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

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

$$x = 3 \quad x = -1$$

$\uparrow$   $\nwarrow$  NOT POSS. b/c

The sides are 3, 4, 5

Question #23

shorter leg =  $s$

longer leg =  $l$

hypotenuse =  $h$

$$s = l - 7$$

$$h = 1 + l$$

$$s^2 + l^2 = h^2$$

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

$$l^2 - 14l + 49 + l^2 = l^2 + 2l + 1$$

$$2l^2 - 14l + 49 = l^2 + 2l + 1$$

$$l^2 - 16l + 48 = 0$$

$$(l-12)(l-4) = 0$$

$$l = 12$$

$$l = 4$$

↗

↖ not possible

$$s = 12 - 7 = 5$$

$$s = 4 - 7 = -3 \times$$

$$h = 12 + 1 = 13$$

The sides are 5 mi, 12 mi, 13 mi

Question #24

rate  $\times$  time = distance

to apt 50  $t$   $d$

from apt 40  $t + \frac{1}{4}$   $d$

$$50t = d \quad 40(t + \frac{1}{4}) = d$$

$$50t = d \quad 40t + 10 = d$$

$$50t = 40t + 10$$

$$10t = 10$$

$$t = 1$$

$$50(1) = 50 = d$$

The distance is 50 miles

Question #25

rate  $\times$  time = distance

to S.D  $r-50$   $\frac{1}{2}$   $\frac{1}{2}(r-50)$

to S.F  $r$   $\frac{1}{2}$   $\frac{1}{2}r$

$$\frac{1}{2}(r-50) + \frac{1}{2}r = 275$$

$$\frac{1}{2}r - 25 + \frac{1}{2}r = 275$$

$$r - 25 = 275$$

$$r = 300$$

$$r - 50 = 250$$

The San Francisco bound plane travels at 300 mph,

The San Diego bound plane travels at 250 mph.