105 Intermediate Algebra

Math 0303
Dept Final Exam
Review

1

11-13-12

① $5x > -20$

$\frac{5x}{5} > \frac{-20}{5}$

$x > -4$

$(-4, +\infty)$

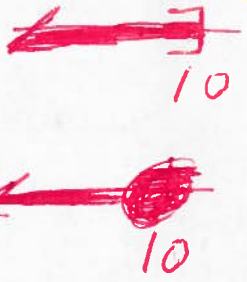
② $18 - 3x \geq -12$

$18 - 3x - 18 \geq -12 - 18$

$-3x \geq -30$

$\frac{-3x}{-3} \leq \frac{-30}{-3}$

$x \leq 10$



$(-\infty, 10]$

③ $9x - 8 \leq 4x - 12$

$9x - 8 + 8 \leq 4x - 12 + 8$

$9x \leq 4x - 4$

$9x - 4x \leq 4x - 4 - 4x$

$5x \leq -4$

$\frac{5x}{5} \leq \frac{-4}{5}$

$x \leq -\frac{4}{5}$

$(-\infty, -\frac{4}{5}]$

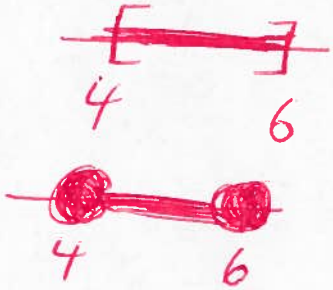
④ $13 \leq 3x + 1 \leq 19$

$13 - 1 \leq 3x + 1 - 1 \leq 19 - 1$

$12 \leq 3x \leq 18$

$\frac{12}{3} \leq \frac{3x}{3} \leq \frac{18}{3}$

$4 \leq x \leq 6$



$[4, 6]$

(5) $-13 \leq -2x+1 < -5$

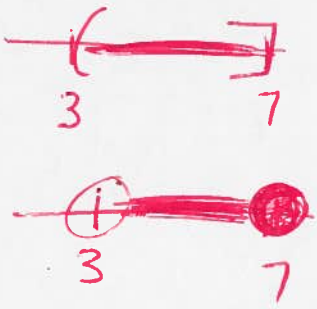
$-13-1 \leq -2x+1-1 < -5-1$

$-14 \leq -2x < -6$

$\frac{-14}{-2} \geqslant \frac{-2x}{-2} > \frac{-6}{-2}$

$7 \geqslant x > 3$

$3 < x \leq 7$



$(3, 7]$

(2)

(6) $|r-2| = 5$

$|x| = a$
$x = -a$ OR $x = a$

Set $r-2 = -5$ OR $r-2 = 5$

$r-2+2 = -5+2$ OR $r-2+2 = 5+2$

$r = -3$ OR $r = 7$

$\{-3, 7\}$

(7.) $|x+6|-3 = 14$

$|x+6|-3+3 = 14+3$

$|x+6| = 17$

$|x| = a$
$x = -a$ OR $x = a$

$x+6 = -17$ OR $x+6 = 17$

$x+6-6 = -17-6$ OR $x+6-6 = 17-6$

$x = -23$ OR $x = 11$

$\{-23, 11\}$

(8) $|9x-4| = |x-7|$

$|x| = a$
$x = -a$ OR $x = a$ (3)

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

$9x-4 = -x+7$

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

$9x = -x+11$ OR $9x = x-3$

$9x+x = -x+11+x$ OR $9x-x = x-3-x$

$10x = 11$ OR $8x = -3$

$\frac{10x}{10} = \frac{11}{10}$ OR $\frac{8x}{8} = \frac{-3}{8}$

$x = \frac{11}{10}$ OR $x = \frac{-3}{8}$

OR

$\left\{\frac{11}{10}, \frac{-3}{8}\right\}$

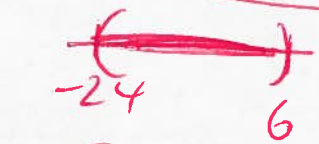
(9) $|x+9| < 15$

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

$-15 < x+9 < 15$

$-15-9 < x+9-9 < 15-9$

$-24 < x < 6$



$(-24, 6)$

(10) $|x+6| > 16$

$|x| > a$
$x < -a$ OR $x > a$

$x+6 < -16$ OR $x+6 > 16$

$x+6-6 < -16-6$ OR $x+6-6 > 16-6$

$x < -22$ OR $x > 10$

$(-\infty, -22) \cup (10, +\infty)$

(11) Graph $y = 2x - 2$

$y = 2(0) - 2$

$y = 0 - 2$

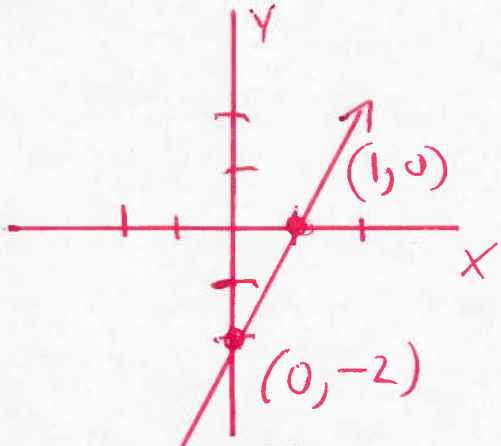
$y = -2$

$y = 2(1) - 2$

$y = 2 - 2$

$y = 0$

x	y
0	-2
1	0



4.

OR

(12) Graph $2x - 3y = 6$

$2x - 3y = 6$

$2x - 3y - 2x = 6 - 2x$

$-3y = 6 - 2x$

$\frac{-3y}{-3} = \frac{6}{-3} - \frac{2x}{-3}$

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

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

$y = mx + b$

x	y
0	-2
3	0

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

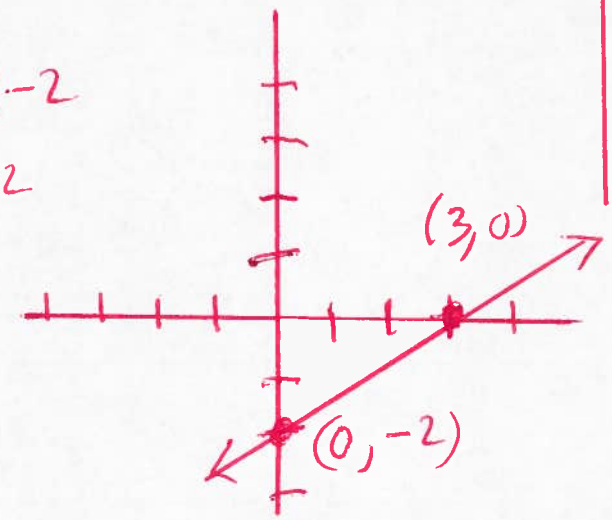
$y = 0 - 2$

$y = -2$

$y = \frac{2}{3}(3) - 2$

$y = 2 - 2$

$y = 0$



Find the intercepts

$2x - 3y = 6$

Let $x = 0$ find y-int

$2(0) - 3y = 6$

$0 - 3y = 6$

$-3y = 6$

$\frac{-3y}{-3} = \frac{6}{-3}$

$y = -2$

$(0, -2)$

Let $y = 0$ to find x-int

$2x - 3(0) = 6$

$2x - 0 = 6$

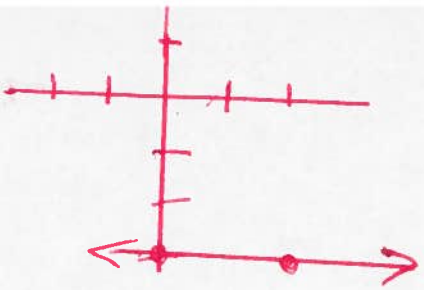
$2x = 6$

$\frac{2x}{2} = \frac{6}{2}$

$x = 3$

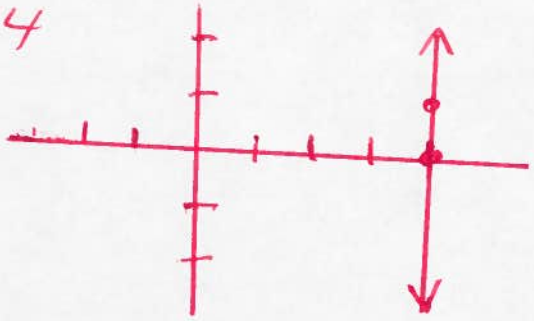
$(3, 0)$

(13) Graph $y = -3$



x	y
0	-3
2	-3

(14) Graph $x = 4$



x	y
4	0
4	1

(15) Find the slope of the line through $(8, 3)$ and $(-4, 4)$.

$x_1 \; y_1 \qquad x_2 \; y_2$

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{(3) - (4)}{(8) - (-4)}$$

$$m = \frac{3 - 4}{8 + 4}$$

$$m = \frac{-1}{12}$$

(16) Find the slope of the line through $(-3, -9)$ and $(-3, -1)$.

$x_1 \; y_1 \qquad x_2 \; y_2$

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{(-9) - (-1)}{(-3) - (-3)}$$

$$m = \frac{-9 + 1}{-3 + 3}$$

$$m = \frac{-8}{0}$$

undefined

(17) Find the slope of the line through $(-8, 8)$ and $(1, 8)$

x_1 y_1 $\quad$ x_2 y_2

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{(8) - (8)}{(-8) - (1)}$$

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

$$m = \frac{0}{-9}$$

$$m = 0$$

(18) Find the slope and y-intercept $\quad y = 4x - 5$

$y = mx + b \quad$ slope $= m$

y-int $= (0, b)$

$m = 4 =$ slope

y-int $= (0, -5)$

(19) Find the equation of the line with point $(-3, 6)$ and slope $= m = 3$.

x_1 y_1

$$y - y_1 = m(x - x_1)$$

$$y - (6) = 3(x - (-3))$$

$$y - 6 = 3(x + 3)$$

$$y - 6 = 3x + 9$$

$$y - 6 + 6 = 3x + 9 + 6$$

$$y = 3x + 15$$

(20) Find the equation of the line through the two points $(-3, -4)$ and $(-2, -6)$.

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

$$y - y_1 = \frac{y_1 - y_2}{x_1 - x_2}(x - x_1)$$

$$y - (-4) = \frac{(-4) - (-6)}{(-3) - (-2)}(x - (-3))$$

$$y + 4 = \frac{-4 + 6}{-3 + 2}(x + 3)$$

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

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

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

$$y = -2x - 10$$

(21) Are lines parallel, perpendicular, or neither?

$y = 6x - 8$ Line 1

$y = -\frac{1}{6}x - 1$ Line 2

$m_1 = 6$ = Slope of Line 1

$m_2 = -\frac{1}{6}$ = Slope of Line 2

$m_2 = -\frac{1}{6} = \frac{-1}{m_1}$

Lines are perpendicular

(22) Are lines parallel, perpendicular, or neither?

$y = 9x - 6$ (Line 1)

$y = 9x + 4$ (Line 2)

$m_1 = 9 =$ Slope of Line 1

$m_2 = 9 =$ Slope of Line 2

$m_1 = m_2 = 9$ Slopes are equal

So Lines are parallel

(23.) Are lines parallel, perpendicular, or neither?

$y = 5x - 4$ Line 1

$y = -5x - 8$ Line 2

$m_1 = 5 =$ Slope of Line 1

$m_2 = -5 =$ Slope of Line 2

$m_1 \neq m_2$ NOT Parallel

$m_1 \neq -\frac{1}{m_2}$ NOT Perpendicular

Neither

(24) Find the equation of the line perpendicular to $y = 5x + 1$ through $(0, -3)$.
$x_1 \quad y_1$

9x

$m = -\frac{0}{5}$ = perpendicular slope.

$y - y_1 = m(x - x_1)$

$y - (-3) = -\frac{1}{5}(x - (0))$

$y + 3 = -\frac{1}{5}(x - 0)$

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

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

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

$y = -\frac{1}{5}x - 3$ OR $y = mx + b$

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

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

$5y = -1x - 15$

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

$5y + x = -15$

$x + 5y = -15$

$ax + by = c$

(25) Find the equation of the line parallel to $y = -\frac{4}{5}x - 1$ through $(0, 1)$.
$x_1 \quad y_1$

$m = -\frac{4}{5}$ = parallel slope

$y - y_1 = m(x - x_1)$

$y - (1) = -\frac{4}{5}(x - (0))$

$y - 1 = -\frac{4}{5}(x - 0)$

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

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

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

$y = -\frac{4}{5}x + 1$ FORM $y = mx + b$

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

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

$5y = -4x + 5$

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

$5y + 4x = 5$

$4x + 5y = 5$ FORM

$ax + by = c$

(26) Graph $y \leq -4x+2$

$y = -4x+2$

$y = -4(0)+2$

$y = 0+2$

$y = 2$

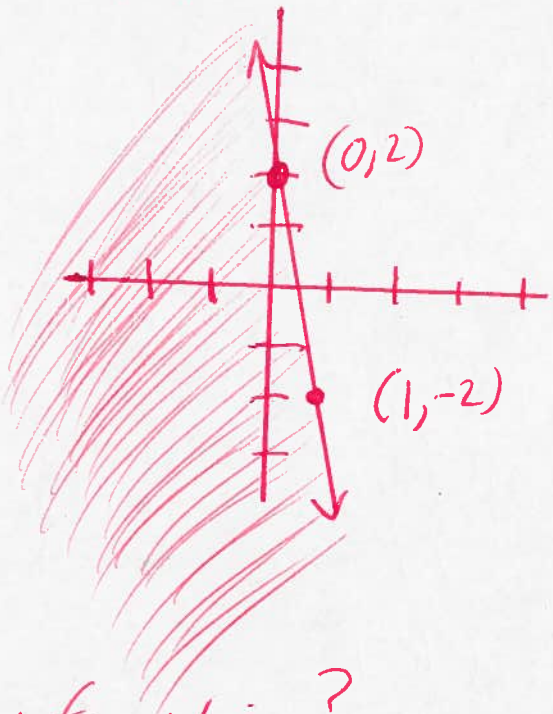
$y = -4x+2$

$y = -4(1)+2$

$y = -4+2$

$y = -2$

x	y
0	2
1	-2



(27) Is relation a function?

$\{(-4,-8), (-3,-4), (+3,-1), (+5,-8)\}$

Yes this is a function.

(28) Graph $h(x) = -3x-5$

$h(0) = -3(0)-5$

$h(0) = 0-5$

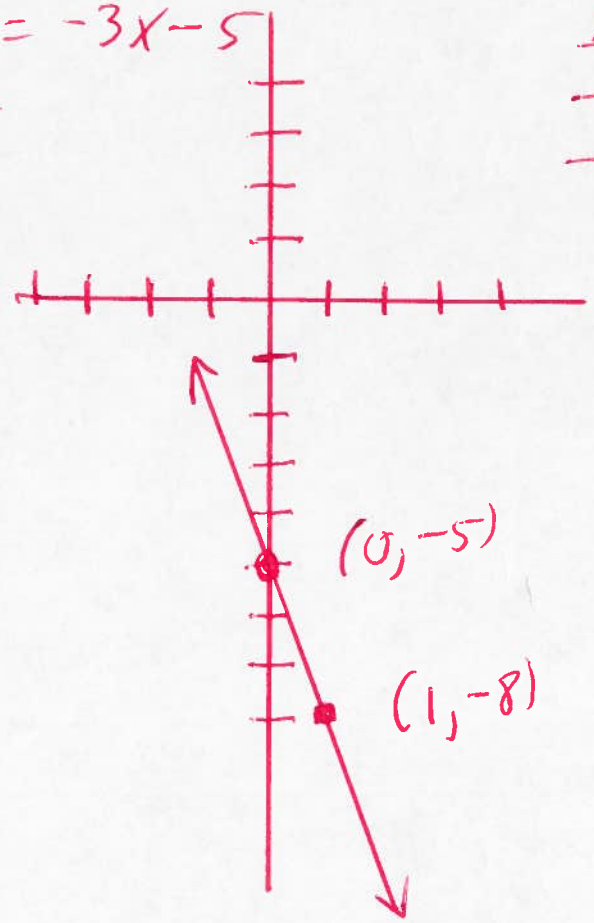
$h(0) = -5$

$h(1) = -3(1)-5$

$h(1) = -3-5$

$h(1) = -8$

x	h(x)
0	-5
1	-8



(29) Graph $f(x) = \frac{1}{2}x + 3$

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

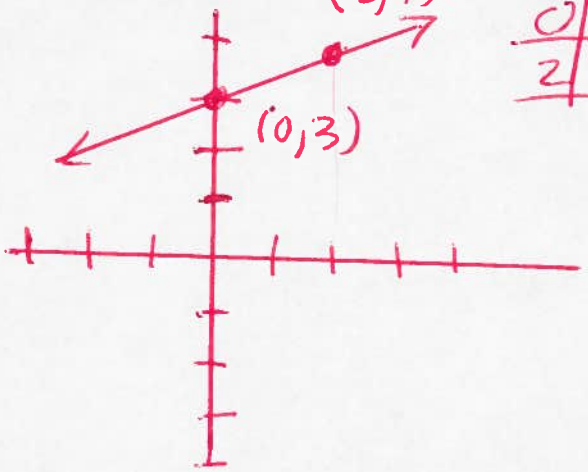
$f(0) = 0 + 3$

$f(0) = 3$

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

$f(2) = 1 + 3$

$f(2) = 4$



x	f(x)
0	3
2	4

11

(30) Evaluate

$g(x) = 3x$

$g(-3) = 3(-3)$

$g(-3) = -9$

$(-3, -9)$

(31.) Evaluate

$f(x) = -3x$

$f(n) = -3(n)$

$f(n) = -3n$

$(n, -3n)$

(32) Evaluate

$g(x) = 8x + 3$

$g(a) = 8(a) + 3$

$g(a) = 8a + 3$

$(a, 8a+3)$

(33) Evaluate

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

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

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

$f(-4) = 5(16) - 16 + 2$

$f(-4) = 80 - 16 + 2$

$f(-4) = 64 + 2$

$f(-4) = 66$

$(-4, 66)$

(34) Evaluate

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

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

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

$(k, \quad 3k^2+4k+5)$

12.

(35) Evaluate

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

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

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

$f(6) = |10|$

$f(6) = (10)$

$f(6) = 10$

$(6, 10)$

(36.) Evaluate

$f(x) = |x-7|$

$f(-9) = |(-9)-7|$

$f(-9) = |-9-7|$

$f(-9) = |-16|$

$f(-9) = (16)$

$f(-9) = 16$

$(-9, 16)$

(37) $h(x) = \dfrac{x^2-4}{x}$

$h(-4) = \dfrac{(-4)^2-4}{(-4)}$

Evaluate

$h(-4) = \dfrac{(-4)(-4)-4}{-4}$

$h(-4) = \dfrac{16-4}{-4}$

$h(-4) = \dfrac{12}{-4}$

$h(-4) = -3$

$(-4, -3)$

(38) Solve by graphing

$x+y=4$

$x-y=2$

$x-y-x=2-x$

$-y=2-x$

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

$y=-2+x$

$y=x-2$

$y=(0)-2$

$y=0-2$

$y=-2$

$y=(3)-2$

$y=3-2$

$y=1$

x	y
0	-2
3	1

$x+y-x=4-x$

$y=4-x$

$y=-x+4$

$y=-(0)+4$

$y=0+4$

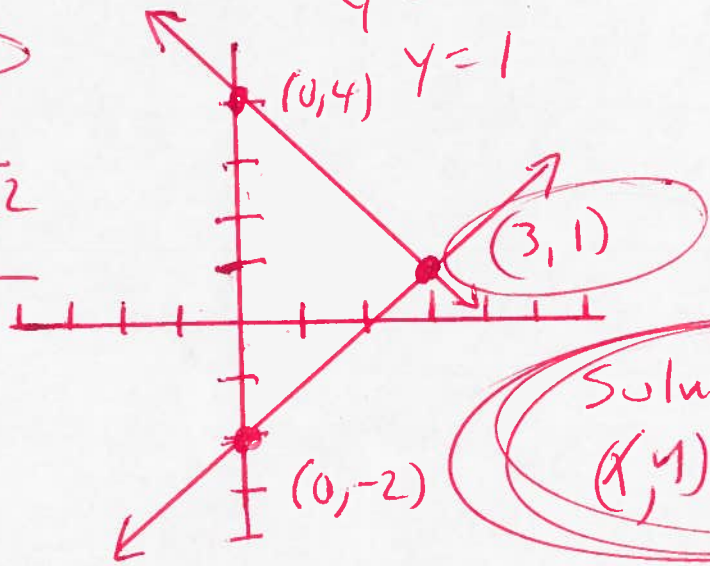
$y=4$

$y=-(3)+4$

$y=-3+4$

$y=1$

x	y
0	4
3	1



Solution

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

(39) Solve by substitution

$x+y=10$

$3x+5y=16$

$x+y-y=10-y$

$x=10-y$

Sub

$3x+5y=16$

$3(10-y)+5y=16$

$30-3y+5y=16$

$30+2y=16$

$30+2y-30=16-30$

$2y=-14$

$\frac{2y}{2}=\frac{-14}{2}$

$y=-7$

Subst

$x+y=10$

$x+(-7)=10$

$x-7=10$

$x-7+7=10+7$

$x=17$

$(x,y)=(17,-7)$

13

(40) $6x+9y=2$

$3y=-2x+4$

$6x+9y=2$

$2x+3y=4$

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

$(2x+3y=4)(9)$

$-18x-27y=-6$

$18x+27y=36$

$0+0=30$

$0 \neq 30$

No solution

$\emptyset$

$\{\ \}$

(41) $x-y=7$

$x+y=5$

$2x+0=12$

$2x=12$

$\frac{2x}{2}=\frac{12}{2}$

$x=6$

subst

$x-y=7$

$(6)-y=7$

$6-y=7$

$6-y-6=7-6$

$-y=1$

$\frac{-y}{-1}=\frac{1}{-1}$

$y=-1$

(x,y)

$(6,-1)$

(42) $4x+3y=8$

$5x+4y=11$

$(4x+3y=8)\ -4$

$(5x+4y=11)\ 3$

$-16x-12y=-32$

$15x+12y=33$

$-1x+0=1$

$-1x=1$

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

$x=-1$

subst

$4x+3y=8$

$4(-1)+3y=8$

$-4+3y=8$

$-4+3y+4=8+4$

$3y=12$

$\frac{3y}{3}=\frac{12}{3}$

$y=4$

(x,y)

$(-1,4)$

(43) $\frac{3}{7x} + \frac{1}{2x} = \frac{-1}{14}$ LCD = $14x$

$\frac{3}{7x}(14x) + \frac{1}{2x}(14x) = \frac{-1}{14}(14x)$

$3(2) + 1(7) = -1(x)$

$6 + 7 = -1x$

$13 = -1x$

$\frac{13}{-1} = \frac{-1x}{-1}$

$-13 = x$

(44) $\frac{2}{y+2} - \frac{5}{y-2} = \frac{10}{y^2-4}$ LCD = $(y+2)(y-2)$

$\frac{2}{y+2} - \frac{5}{y-2} = \frac{10}{(y+2)(y-2)}$

$\frac{2}{y+2}(y+2)(y-2) - \frac{5}{(y-2)}(y+2)(y-2) = \frac{10}{(y+2)(y-2)}(y+2)(y-2)$

$2(y-2) - 5(y+2) = 10$

$2y - 4 - 5y - 10 = 10$

$-3y - 14 = 10$

$-3y - 14 + 14 = 10 + 14$

$-3y = 24$

$\frac{-3y}{-3} = \frac{24}{-3}$

$y = -8$

(45) Simplify

$\sqrt{180} =$

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

2 | 180
2 | 90
3 | 45
3 | 15
5 | 5
1

$\sqrt{36 \cdot 5} =$

$\sqrt{36}\sqrt{5} =$

$6\sqrt{5} =$

(46) Simplify

$\sqrt{169x^6yz^9} =$

$\sqrt{(13)^2 x^6 y^1 z^8 z^1} =$

$13x^3z^4\sqrt{y^1z^1} =$

16

(47) Simplify

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

2 | 20
2 | 10
5 | 5
1

$8\sqrt{5} + 3\sqrt{20} =$

$8\sqrt{5} + 3\sqrt{4 \cdot 5} =$

$8\sqrt{5} + 3\sqrt{4}\sqrt{5} =$

$8\sqrt{5} + 3(2)\sqrt{5} =$

$8\sqrt{5} + 6\sqrt{5} =$

$14\sqrt{5} =$

(48) Simplify

2 | 18
3 | 9
3 | 3
1

$\sqrt{3x^3}\sqrt{6x^2} =$

$\sqrt{(3x^3)(6x^2)} =$

$\sqrt{18x^5} = 3x^2\sqrt{2x} =$

$\sqrt{9 \cdot 2 \cdot x^4 x^1} =$

(49) $\frac{2}{8-\sqrt{3}} =$

$\left(\frac{2}{8-\sqrt{3}}\right)\left(\frac{8+\sqrt{3}}{8+\sqrt{3}}\right) =$

$\frac{16+2\sqrt{3}}{64+8\sqrt{3}-8\sqrt{3}-(\sqrt{3})^2} =$

$\frac{16+2\sqrt{3}}{64-(\sqrt{3})^2} =$

$\frac{16+2\sqrt{3}}{64-3} =$

$\frac{16+2\sqrt{3}}{61} =$

$\frac{16}{61} + \frac{2\sqrt{3}}{61} =$

(50) $\frac{\sqrt{7}}{\sqrt{7}-\sqrt{2}} =$

$\left(\frac{\sqrt{7}}{\sqrt{7}-\sqrt{2}}\right)\left(\frac{\sqrt{7}+\sqrt{2}}{\sqrt{7}+\sqrt{2}}\right) =$

$\frac{(\sqrt{7})^2+\sqrt{7}\sqrt{2}}{(\sqrt{7})^2+\sqrt{7}\sqrt{2}-\sqrt{7}\sqrt{2}-(\sqrt{2})^2}$

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

$\frac{7+\sqrt{14}}{7-2} =$

$\frac{7+\sqrt{14}}{5} =$

$\frac{7}{5} + \frac{\sqrt{14}}{5} =$

(51) $\sqrt{x+3} = 3$

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

$x+3 = 9$

$x+3-3 = 9-3$

$x = 6$

Ck $\sqrt{x+3} = 3$

$\sqrt{6+3} = 3$

$\sqrt{9} = 3$

$3 = 3$ ✓

Good

(52) $\sqrt{7-x} = x-1$

$(\sqrt{7-x})^2 = (x-1)^2$

$7-x = (x-1)(x-1)$

$7-x = x^2-x-x+1$

$7-x = x^2-2x+1$

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

$0 = x^2-x-6$

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

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

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

BAD Good

Ck

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

$\sqrt{7-(-2)} = (-2)-1$

$\sqrt{7+2} = -2-1$

$\sqrt{9} = -3$

$3 \neq -3$

Ck

$\sqrt{7-(3)} = (3)-1$

$\sqrt{7-3} = 3-1$

$\sqrt{4} = 2$

$2 = 2$ ✓

(53) Find the distance $(5, -2)$ and $(2, 2)$

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

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

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

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

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

$d = \sqrt{9+16}$

$d = \sqrt{25}$

$= 5$

$\{5\}$

(54) Find the distance between (10,0) and (0,-11)

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

$d = \sqrt{((10) - (0))^2 + ((0) - (-11))^2}$

$d = \sqrt{(10-0)^2 + (0+11)^2}$

$d = \sqrt{(10)^2 + (11)^2}$

$d = \sqrt{100 + 121}$

$= \sqrt{221}$

(55) $\sqrt[3]{1000} =$

$\sqrt[3]{(10)^3} =$

$10 =$

(56) $\sqrt[3]{-27a^{11}b^{13}} =$

$\sqrt[3]{(-3)^3 a^9 a^2 b^{12} b^1} =$

$-3a^3b^4\sqrt[3]{a^2b^1} =$

(57) $\sqrt[3]{81} + 4\sqrt[3]{3} - \sqrt[3]{24} =$

$\sqrt[3]{(3)^3 3^1} + 4\sqrt[3]{3} - \sqrt[3]{(2)^3 3} =$

$3\sqrt[3]{3} + 4\sqrt[3]{3} - 2\sqrt[3]{3} =$

$5\sqrt[3]{3} =$

3 | 81	2 | 24
3 | 27	2 | 12
3 | 9	2 | 6
3 | 3	3 | 3
1	1

(58) $\sqrt[3]{x+3} = 4$

$(\sqrt[3]{x+3})^3 = (4)^3$

$x+3 = 64$

$x+3-3 = 64-3$

$x = 61$

20.

(59) Is relation a function?

$\{(1,9), (-1,-8), (-6,-5), (6,-8)\}$

Yes a function

Domain = $D = \{-6, -1, 1, 6\}$

Range = $R = \{-8, -5, 9\}$

(60) Is relation a function?

$\{(2,9), (-2,-9), (-2,-4), (6,-9)\}$

NOT a function $(-2,-9)$ and $(-2,-4)$

OR

$f(-2) = -9$ and $f(-2) = -4$

(61) Evaluate

$f(x) = 9x+4$

$f(-3) = 9(-3)+4$

$f(-3) = -27+4$

$f(-3) = -23$

$(-3, -23)$

(62) Evaluate

$h(x) = 3x^2 - 7x - 4$

$h(-5) = 3(-5)^2 - 7(-5) - 4$

$h(-5) = 3(-5)(-5) - 7(-5) - 4$

$h(-5) = 3(25) - 7(-5) - 4$

$h(-5) = 75 + 35 - 4$

$h(-5) = 110 - 4$

$h(-5) = 106$

21.

$(-5, 106)$

(63.) Evaluate

$f(x) = |5x - 4|$

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

$f(-3) = |-15 - 4|$

$f(-3) = |-19|$

$f(-3) = (19)$

$f(-3) = 19$

$(-3, 19)$

(64) Evaluate

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

$g(t) = -(t)^2 - 4(t) + 9$

$g(t) = -t^2 - 4t + 9$

$(t, -t^2 - 4t + 9)$

(65) Evaluate

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

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

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

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

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

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

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

$(x-1,\ 2x^2 - 9x + 4)$

(66) Evaluate

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

$f(a+h) = (a+h)^2 + 6$

$f(a+h) = (a+h)(a+h) + 6$

$f(a+h) = a^2 + ah + ah + h^2 + 6$

$f(a+h) = a^2 + 2ah + h^2 + 6$

$(a+h,\ a^2 + 2ah + h^2 + 6)$

(67) Simplify

$f(x) = 8x + 8$

$$\frac{f(a+h) - f(a)}{h}$$

$$\frac{(8(a+h) + 8) - (8(a) + 8)}{h}$$

$$\frac{(8a + 8h + 8) - (8a + 8)}{h} =$$

$$\frac{8a + 8h + 8 - 8a - 8}{h} =$$

$$\frac{8h}{h} =$$

$8 =$

(68) Simplify,

$f(x) = 7x^2$

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

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

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

$$\frac{(7(a^2+ah+ah+h^2))-(7a^2)}{h} =$$

$$\frac{(7(a^2+2ah+h^2))-(7a^2)}{h} =$$

$$\frac{7a^2+14ah+7h^2-7a^2}{h} =$$

$$\frac{14ah+7h^2}{h} =$$

$$14a+7h =$$

23.

(69) $f(x) = 4-9x$ and $g(x) = -2x+9$

$(f+g)(x) =$

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

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

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

$-11x+13 =$

D = Domain = $(-\infty, \infty)$

(10) $f(x) = 2x^2 - 3$ and $g(x) = 7x - 4$

$(f-g)(x) =$

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

$(2x^2 - 3) - (7x - 4) =$

$2x^2 - 3 - 7x + 4 =$

$2x^2 - 7x + 1 =$

Domain $= D = (-\infty, \infty)$

24

(11) $f(x) = 5x + 1$ and $g(x) = 2x - 5$

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

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

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

Domain set $2x - 5 = 0$

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

$2x = 5$

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

$x = 5/2$

Domain $= D = \{x \mid x \neq 5/2\}$

(12) $f(x) = 5x^2 - 2$ and $g(x) = 4x + 1$

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

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

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

$20x^3 + 5x^2 - 8x - 2 =$

Domain $= D = (-\infty, \infty)$

(13) $f(x) = 7x + 15$ and $g(x) = 4x - 1$

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

$f(g(a)) =$

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

$f(4a - 1) =$

$7(4a - 1) + 15 =$

$28a - 7 + 15 =$

$\boxed{28a + 8 =}$

25

(14) $f(x) = 4x^2 + 3x + 8$ and $g(x) = 3x - 5$

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

$g(f(x)) =$

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

$3(4x^2 + 3x + 8) - 5 =$

$12x^2 + 9x + 24 - 5 =$

$\boxed{12x^2 + 9x + 19 =}$

Domain $= D = (-\infty, \infty)$

(15) $f(t) = \sqrt{t - 5}$ and $g(t) = 4t + 8$

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

$f(g(t)) =$

$f(4t + 8) =$

$\sqrt{(4t + 8) - 5} =$

$\sqrt{4t + 8 - 5} =$

$\rightarrow \sqrt{4t + 3} =$

Set $4t + 3 \geq 0$

$4t + 3 - 3 \geq 0 - 3$

$4t \geq -3$

$\frac{4t}{4} \geq \frac{-3}{4}$

$t \geq -3/4$

Domain

$D = \{t \mid t \geq -3/4\}$

OR

$[-3/4, \infty)$

(76) $f(x) = -2x + 2$ and $g(x) = 3x^2 + 2x + 7$

$(g \circ f)(6) =$

$g(f(6)) =$

$g(-2(6)+2) =$

$g(-12+2) =$

$g(-10) =$

$3(-10)^2 + 2(-10) + 7 =$

$3(-10)(-10) + 2(-10) + 7 =$

$3(100) + 2(-10) + 7 =$

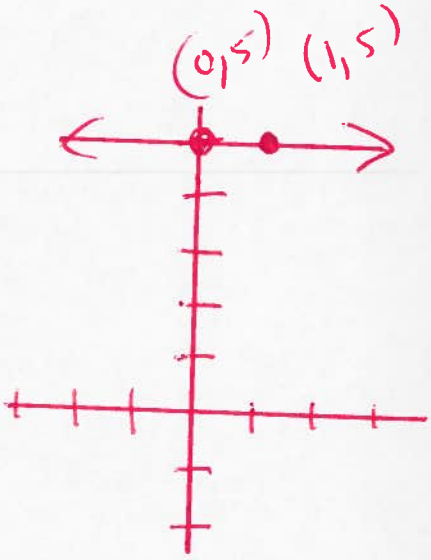
$300 - 20 + 7 =$

$287 =$

(77) Graph

$f(x) = 5$

x	f(x)
0	5
1	5



(78) Graph

$g(x) = x - 4$

$g(0) = (0) - 4$

$g(0) = 0 - 4$

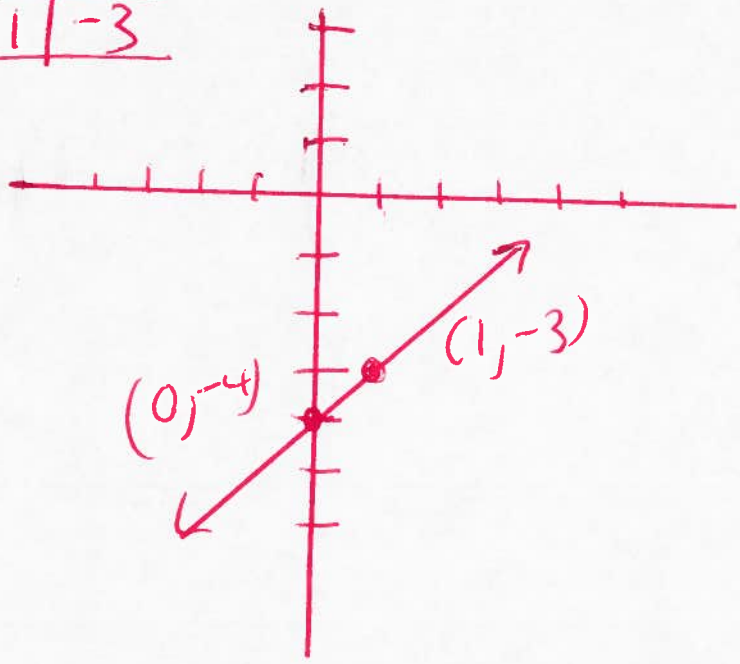
$g(0) = -4$

$g(1) = (1) - 4$

$g(1) = 1 - 4$

$g(1) = -3$

x	g(x)
0	-4
1	-3



27

(79) Graph

$h(x) = x^2 - 2$

$h(-1) = (-1)^2 - 2$

$h(-1) = (-1)(-1) - 2$

$h(-1) = 1 - 2$

$h(-1) = -1$

$h(0) = (0)^2 - 2$

$h(0) = (0)(0) - 2$

$h(0) = 0 - 2$

$h(0) = -2$

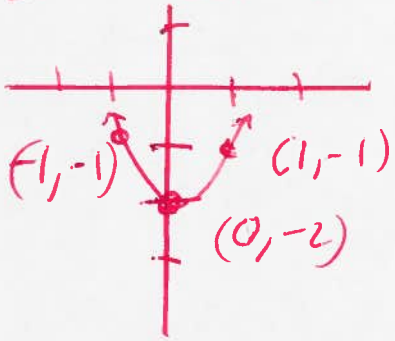
$h(1) = (1)^2 - 2$

$h(1) = (1)(1) - 2$

$h(1) = 1 - 2$

$h(1) = -1$

x	h(x)
-1	-1
0	-2
1	-1



(80) Graph

$f(x) = |x - 9|$

$f(8) = |8 - 9|$

$f(8) = |-1|$

$f(8) = (1)$

$f(8) = 1$

$f(9) = |9 - 9|$

$f(9) = |0|$

$f(9) = (0)$

$f(9) = 0$

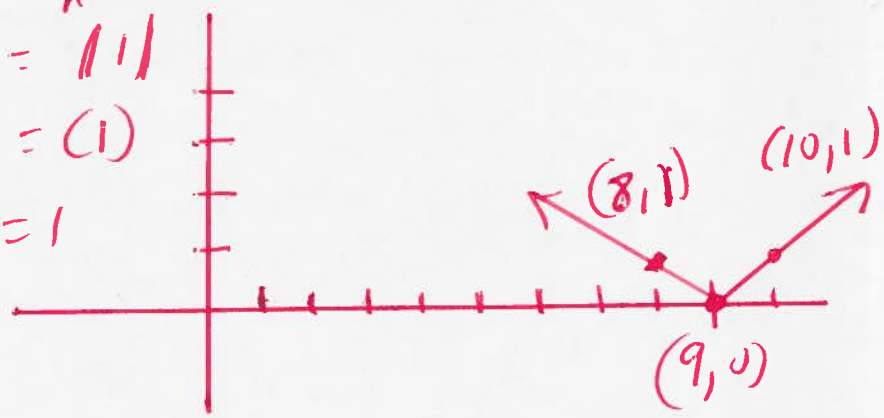
$f(10) = |10 - 9|$

$f(10) = |1|$

$f(10) = (1)$

$f(10) = 1$

x	f(x)
8	1
9	0
10	1

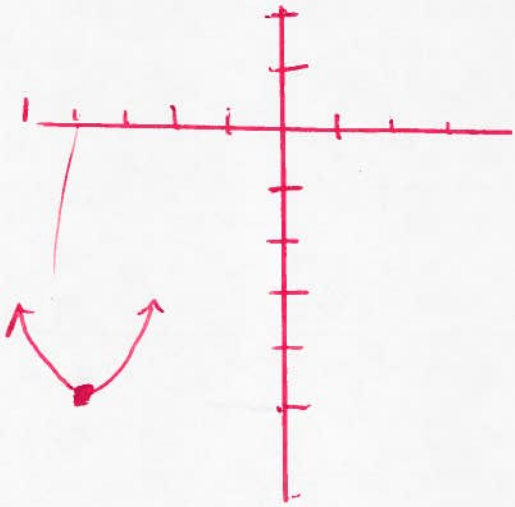


(81) Graph

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

Vertex $= (-4, -5)$

Opens up

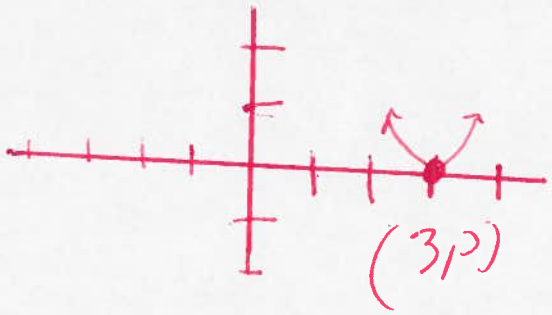


(82) Graph

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

Vertex $= (3, 0)$

Opens up



(83) Graph

$f(x) = |x+3|$

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

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

$f(-4) = (1)$

$f(-4) = 1$

$f(-3) = |-3+3|$

$f(-3) = |0|$

$f(-3) = (0)$

$f(-3) = 0$

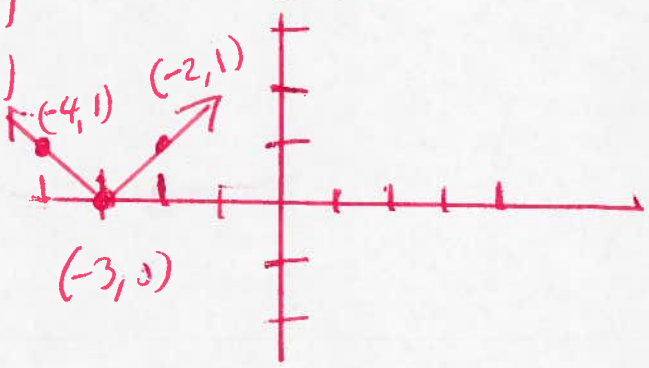
$f(-2) = |-2+3|$

$f(-2) = |1|$

$f(-2) = (1)$

$f(-2) = 1$

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



(84) Graph

$f(x) = \sqrt{x+2} - 7$

$f(-2) = \sqrt{-2+2} - 7$

$f(-2) = \sqrt{0} - 7$

$f(-2) = 0 - 7$

$f(-2) = -7$

$f(-1) = \sqrt{-1+2} - 7$

$f(-1) = \sqrt{1} - 7$

$f(-1) = 1 - 7$

$f(-1) = -6$

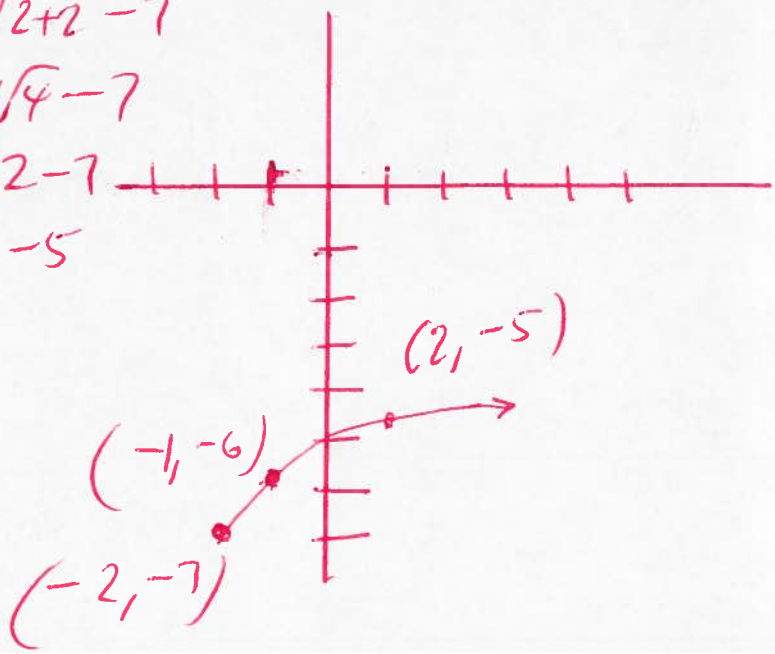
$f(2) = \sqrt{2+2} - 7$

$f(2) = \sqrt{4} - 7$

$f(2) = 2 - 7$

$f(2) = -5$

x	f(x)
-2	-7
-1	-6
2	-5



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(85) Graph

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

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

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

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

$g(-1) = -4$

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

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

$g(0) = 0 - 3$

$g(0) = -3$

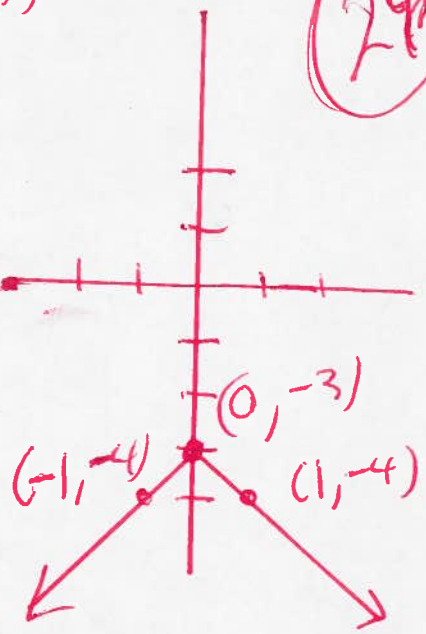
$g(1) = -|1| - 3$

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

$g(1) = -1 - 3$

$g(1) = -4$

x	g(x)
-1	-4
0	-3
1	-4



(86) Graph

$g(x) = 7 - |x - 4|$

$g(3) = 7 - |3 - 4|$

$g(3) = 7 - |-1|$

$g(3) = 7 - (1)$

$g(3) = 7 - 1$

$g(3) = 6$

$g(5) = 7 - |5 - 4|$

$g(5) = 7 - |1|$

$g(5) = 7 - (1)$

$g(5) = 7 - 1$

$g(5) = 6$

$g(4) = 7 - |4 - 4|$

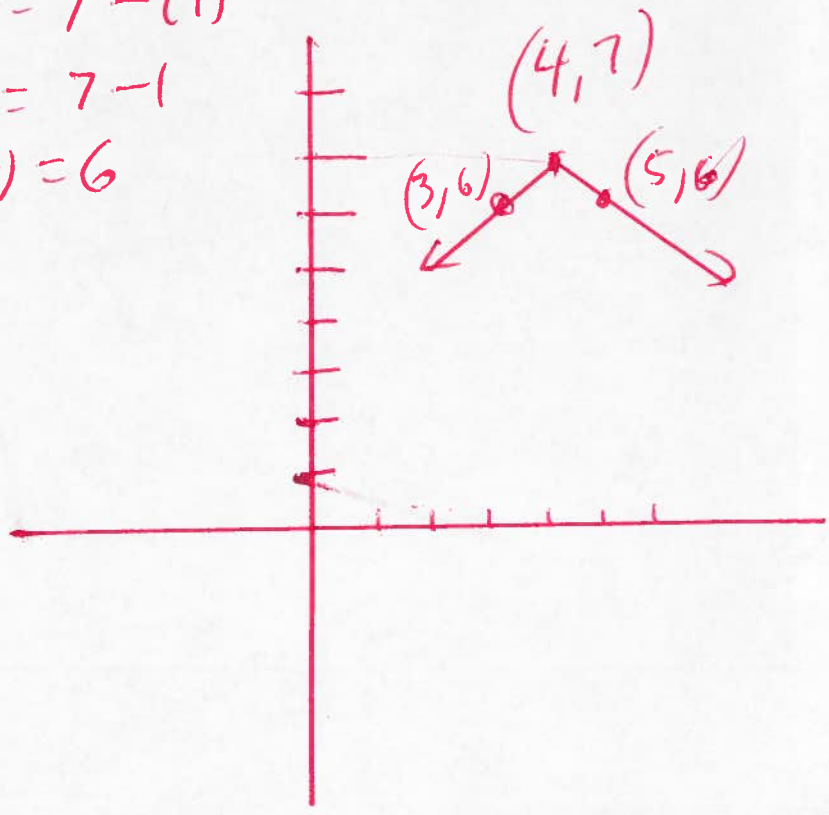
$g(4) = 7 - |0|$

$g(4) = 7 - (0)$

$g(4) = 7 - 0$

$g(4) = 7$

x	g(x)
3	6
4	7
5	6



(87) Simplify

$(-6-7i)+(12+4i)=$

$-6-7i+12+4i=$

$\boxed{6-3i=}$

(88) $(2-7i)(9+4i)$

$18+8i-63i-28i^2=$

$18-55i-28i^2=$

$18-55i-28(-1)=$

$18-55i+28=$

$\boxed{46-55i=}$

(89) $\frac{5-i}{-9+4i}=$

$\left(\frac{5-i}{-9+4i}\right)\left(\frac{-9-4i}{-9-4i}\right)=$

$\frac{-45-20i+9i+4i^2}{81+36i-36i-16i^2}=$

$\frac{-45-11i+4i^2}{81-16i^2}=$

$\frac{-45-11i+4(-1)}{81-16(-1)}=$

$\frac{-45-11i-4}{81+16}=$

$\frac{-49-11i}{97}=$

$\boxed{\frac{-49}{97}-\frac{11}{97}i=}$

30

(90) Soln

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

Set $x-3=0$ OR $8x-3=0$

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

$x=3$ OR $8x=3$

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

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

$\{3, \frac{3}{8}\}$

31.

(91) Soln

$7x^2+19x-6=0$

$(7x-2)(x+3)=0$

Set $7x-2=0$ OR $x+3=0$

$7x-2+2=0+2$ OR $x+3-3=0-3$

$7x=2$ OR $x=-3$

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

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

$\{\frac{2}{7}, -3\}$

(92) $(x-7)^2=25$

$\sqrt{(x-7)^2}=\pm\sqrt{25}$

$x-7=\pm 5$

$x-7=-5$ OR $x-7=5$

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

$x=2$ OR $x=12$

$\{2, 12\}$

(93) $x^2+12x+20=0$ Complete the Square

$x^2+12x=-20$

$x^2+12x+\left(\frac{1}{2}(12)\right)^2=-20+\left(\frac{1}{2}(12)\right)^2$

$x^2+12x+(6)^2=-20+(6)^2$

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

$(x+6)(x+6)=16$

$(x+6)^2=16$

$\sqrt{(x+6)^2}=\pm\sqrt{16}$

$x+6=\pm 4$

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

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

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

$\{-10, -2\}$

32.

(94) $x^2 - 6x + 18 = 0$ complete the square

$x^2 - 6x = -18$

$x^2 - 6x + \left(\frac{1}{2}(-6)\right)^2 = -18 + \left(\frac{1}{2}(-6)\right)^2$

$x^2 - 6x + (-3)^2 = -18 + (-3)^2$

$x^2 - 6x + 9 = -18 + 9$

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

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

$\sqrt{(x-3)^2} = \pm\sqrt{-9}$

$x - 3 = \pm 3i$

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

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

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

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

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

33.

(95) $5x^2+8x=4$ 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 $x=\frac{-8+12}{10}$

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

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

$\left\{-2, \frac{2}{5}\right\}$

34.

(96) $4x^2 - 3x + 1 = 0$ Use Quadratic Formula

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

35.

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

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

$$x = \frac{3 \pm \sqrt{9 - 16}}{8}$$

$$x = \frac{3 \pm \sqrt{-7}}{8}$$

$$x = \frac{3 \pm \sqrt{7}\sqrt{-1}}{8}$$

$$x = \frac{3 \pm \sqrt{7}\, i}{8}$$

$$x = \frac{3}{8} \pm \frac{\sqrt{7}}{8} i$$

$x = \frac{3}{8} - \frac{\sqrt{7}}{8} i$ OR $x = \frac{3}{8} + \frac{\sqrt{7}}{8} i$

$\left\{ \frac{3}{8} - \frac{\sqrt{7}}{8} i, \quad \frac{3}{8} + \frac{\sqrt{7}}{8} i \right\}$

(97) $x^4 + 12x^2 - 64 = 0$

$(x^2 - 4)(x^2 + 16) = 0$

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

361

Set $x+2=0$ OR $x-2=0$ OR $x^2+16=0$

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

$x=-2$ OR $x=2$ OR $\sqrt{x^2} = \pm\sqrt{-16}$

OR $x = \pm 4i$

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

$x=-4i$ OR $x=4i$

(98) $(4x-4)^2 - 6(4x-4) - 7 = 0$

$m = 4x-4$

$m^2 - 6m - 7 = 0$

$(m+1)(m-7) = 0$

$m+1=0$ OR $m-7=0$

$m=-1$ OR $m=7$

Sub $4x-4=-1$ OR $4x-4=7$

$4x-4+4=-1+4$ OR $4x-4+4=7+4$

$4x=3$ OR $4x=11$

$\frac{4x}{4} = \frac{3}{4}$ OR $\frac{4x}{4} = \frac{11}{4}$

OR

$x = \frac{3}{4}$ $x = \frac{11}{4}$

$\left\{\frac{3}{4}, \frac{11}{4}\right\}$

(99) $(x+2)(x-5)<0$

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

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

Ck $(-3+2)(-3-5)<0$?

$(-1)(-8)<0$?

$8<0$ NO

Ck $(1+2)(1-5)<0$?

$(3)(-4)<0$

$-12<0$ YES

(37)

Ck $(6+2)(6-5)<0$?

$(8)(1)<0$?

$8<0$

NO

$(-2, 5)$

(100) $\frac{x-2}{x+9}>0$

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

$x=2$ OR $x=-9$

Ck $\frac{-10-2}{-10+9}>0$?

$\frac{-12}{-1}>0$?

$12>0$ YES

Ck $\frac{1-2}{1+9}>0$

$\frac{-1}{10}>0$ NO

Ck $\frac{3-2}{3+9}>0$

$\frac{1}{12}>0$ YES

$(-\infty, -9) \cup (2, +\infty)$

(101) Determine if the ordered pair is a solution to the equation $(2, 2)$ (x, y)

$2x + y = 6$?

$2(2) + (2) = 6$?

$4 + 2 = 6$?

$6 = 6$ YES

38.

(102) $\frac{7}{9 - \sqrt{3}} =$

$\left(\frac{7}{9-\sqrt{3}}\right)\left(\frac{9+\sqrt{3}}{9+\sqrt{3}}\right) =$

$\frac{63 + 7\sqrt{3}}{81 + 9\sqrt{3} - 9\sqrt{3} - (\sqrt{3})^2} =$

$\frac{63 + 7\sqrt{3}}{81 - (\sqrt{3})^2} =$

$\frac{63 + 7\sqrt{3}}{81 - 3} =$

$\frac{63 + 7\sqrt{3}}{78} =$

103 Example #1

$\sqrt[4]{2x-6}+11=13$

$\sqrt[4]{2x-6}+11-11=13-11$

$\sqrt[4]{2x-6}=2$

$\left(\sqrt[4]{2x-6}\right)^4=(2)^4$

$2x-6=16$

$2x-6+6=16+6$

$2x=22$

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

$x=11$

Example #2

$\sqrt[3]{2x-6}+11=13$

$\sqrt[3]{2x-6}+11-11=13-11$

$\sqrt[3]{2x-6}=2$

$\left(\sqrt[3]{2x-6}\right)^3=(2)^3$

$2x-6=8$

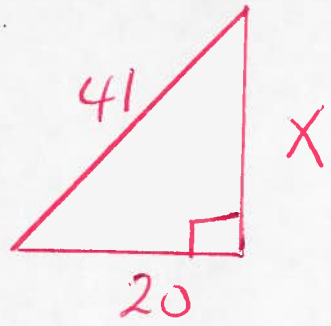
$2x-6+6=8+6$

$2x=14$

$\frac{2x}{2}=\frac{14}{2}$

$x=7$

104



$A = 20$, $B = x$, $C = 41$

$A^2 + B^2 = C^2$

$(20)^2 + (x)^2 = (41)^2$

$400 + x^2 = 1681$

$400 + x^2 - 400 = 1681 - 400$

$x^2 = 1281$

$\sqrt{x^2} = \sqrt{1281}$

$x = 35.791060 3363$

401

105 $(2 + 4\sqrt{11})(2 - 4\sqrt{11}) =$

$4 - 8\sqrt{11} + 8\sqrt{11} - 16(\sqrt{11})^2 =$

$4 - 16(\sqrt{11})^2 =$

$4 - 16(11) =$

$4 - 176 =$

$-172 =$