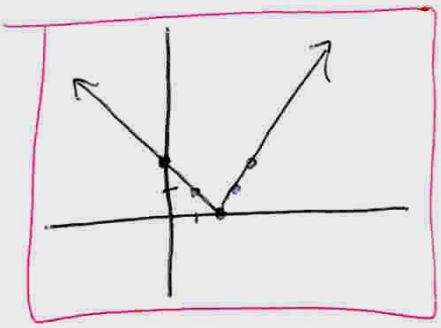
1010 Exam 2 Review Key

($\sqrt{36}=6$, not ± 6)

1. $x=36, y>0$ so $0=\sqrt[3]{36}-6 \Rightarrow \sqrt[3]{36}=6$? NO.
NOT A SOLUTION.

2.

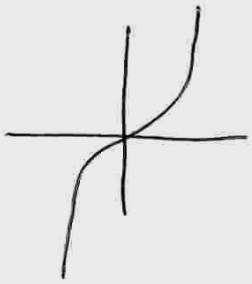
X	Y
0	$\lvert 0-2\rvert = 2$
1	$\lvert 1-2\rvert = 1$
2	$\lvert 2-2\rvert = 0$
3	$\lvert 3-2\rvert = 1$
4	$\lvert 4-2\rvert = 2$



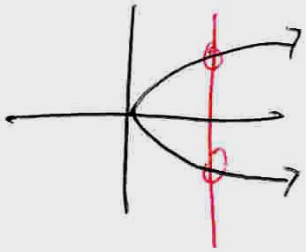
3. DOMAIN is X, so DOMAIN $= \{6, 8, 11, -6\}$
RANGE is Y, so RANGE $= \{-7, 9, 4, 3, -3\}$

4. DOMAIN is INPUT, so DOMAIN $= \{$ALICE, BRAD, CARL$\}$
RANGE is OUTPUT, so RANGE $= \{$fur, dust, milk$\}$
NOT A FUNCTION since CARL is ASSIGNED 2 VALUES, dust & milk (ONE x, 2 y's)

5. Yes, since we have y' & no $\pm$ x's.
ALSO, A GRAPH & VERTICAL LINE TEST CAN BE USED



6. NO, since we have y^2. The points (1,1), (1,-1) are solutions 1 x, 2 y's.



NO.

7. VERTICAL LINE TEST PASSES, SO FUNCTION.

8. SMALLEST X VALUE IS -8, LARGEST IS 8, SO DOM $= [-8, 8]$
SMALLEST Y VALUE IS -3, LARGEST IS 3, SO RAN $= [-3, 3]$
VERTICAL LINE TEST FAILS, SO NOT FUNCTION

9. SETTING UP THE FUNCTION IN BLANKS:

$f(\ \ ) = 4(\ \ )^2 + 5(\ \ ) + 6$

so $f(3) = 4(3)^2 + 5(3) + 6 = 4(9) + 15 + 6 = \boxed{57}$

10. $f(\ \ ) = -5$ so $\boxed{f(3) = -5}$

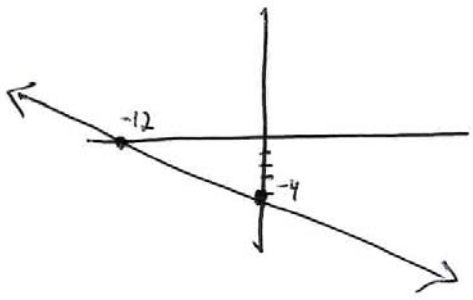
11. $f(\ \ ) = 7(\ \ )^2 + 3(\ \ )$ so $f(4) = 7(4)^2 + 3(4)$
$= 7(16) + 12 = \boxed{124}$

12. SOLVE FOR Y: $-x - 2y = -6 \Rightarrow \frac{-2y}{-2} = \frac{x}{-2} - \frac{6}{-2}$
(add x to both sides; add x to both sides)

$\Rightarrow y = -\frac{1}{2}x + 3 \Rightarrow \boxed{f(x) = -\frac{1}{2}x + 3}$

13. $x + 3y = -12$

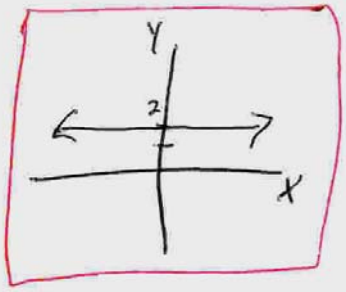
x	y
0	$3y = -12$, $y = -4$
$x = -12$	0



14. $y = 2$ SINCE THERE IS NO x, THIS IS EITHER HORIZONTAL OR VERTICAL.

CROSSES Axis @ point

$y = 2$



15. $(2,-7)$, $(-2,9)$ $\quad (x_1, y_1)$ (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - -2}{-2 - 2} = \frac{11}{-4} = -\frac{11}{4} = -\frac{11}{4}$$

16. SOLVE FOR y: $2y - 3x = -7$ $\quad +3x \quad +3x$

$$\Rightarrow \frac{2y}{2} = \frac{3x}{2} - \frac{7}{2}$$

$\Rightarrow y = \frac{3}{2}x - \frac{7}{2}$ IS IN SLOPE Y-INTERCEPT FORM $y = mx + b$, SO

$$m = \frac{3}{2}$$

17. $f(x) = -2x + 8$

$$m = -2$$

18. $x = -5$ CROSSES x Axis @ -5

VERTICAL LINE HAS UNDEFINED SLOPE

19. SLOPES OF PERPENDICULAR LINES HAVE TO BE OPPOSITE RECIPROCALS, LIKE $3, -\frac{1}{3}$ OR $-\frac{2}{5}, \frac{5}{2}$.

SLOPES OF PARALLEL LINES HAVE TO BE EQUAL.

$f(x) = 14x - 7$

$g(x) = \frac{1}{14}x + 9$

$14 \neq \frac{1}{14}$ ARE NOT EQUAL & NOT OPPOSITE RECIPROCALS

NEITHER

20. $m = -\frac{4}{7}$, $(4, 5)$

$y = mx + b$

$5 = -\frac{4}{7}(4) + b$

$35 = -16 + 7b$

$+16 \quad +16$

$\frac{51}{7} = \frac{7b}{7}$

$b = \frac{51}{7}$

SO $\boxed{y = -\frac{4}{7}x + \frac{51}{7}}$

ALTERNATE METHOD

$m = -\frac{4}{7}$, $(4, 5)$

$y - y_1 = m(x - x_1)$ POINT SLOPE FORM

$y - 5 = -\frac{4}{7}(x - 4)$

$y - 5 = -\frac{4}{7}x + \frac{16}{7}$

$+5 \quad +5$

$\boxed{y = -\frac{4}{7}x + \frac{51}{7}}$

$\left(\frac{16}{7} + 5 = \frac{16}{7} + \frac{35}{7} = \frac{51}{7} \right)$

21. THROUGH $(3,-17), (5,-31)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-31 - -17}{5 - 3} = \frac{-14}{2} = -7 = m$$

$m = -7$ $(3,-17)$ ← OR YOU COULD USE $(5,-31)$

$y = mx + b \Rightarrow -17 = -7(3) + b \Rightarrow -17 = -21 + b$

$+21 \quad +21$

$b = 4$

$y = -7x + 4$

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

22. STANDARD FORM $m = \frac{-4}{9}$, $(2,3)$

$y = mx + b \Rightarrow 3 = \frac{-4}{9}(2) + b \Rightarrow$

$\Rightarrow 3 = \frac{-8}{9} + b \Rightarrow b = 3\frac{8}{9} = \frac{35}{9}$ so $y = \frac{-4}{9}x + \frac{35}{9}$

$+\frac{8}{9} \quad +\frac{8}{9}$

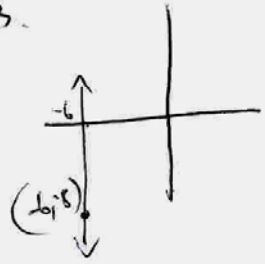
STANDARD FORM HAS NO FRACTIONS & X & Y ARE ON LEFT SIDE, SO

$9 \cdot y = \frac{9 \cdot -4}{9}x + \frac{9 \cdot 35}{9}$

$9y = -4x + 35 \Rightarrow 4x + 9y = 35$

$+4x \quad +4x$

23.



THIS LINE CROSSES THE X AXIS @ -6,

SO $x = -6$

24. Parallel to $f(x) = 3x - 4$ would have the same slope, so

$m = 3$, $(6, 2) \Rightarrow 2 = 3(6) + b \Rightarrow 2 = 18 + b \Rightarrow b = -16$

$-18 \quad -18$

$f(x) = 3x - 16$

25. $x - 2y = 2$

$-x \quad -x$

$-2y = -x + 2$

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

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

LINE HAS SLOPE $\frac{1}{2}$, SO OUR PERPENDICULAR LINE HAS SLOPE -2.

$m = -2$, $(-4, -5) \Rightarrow -5 = -2(-4) + b \Rightarrow$

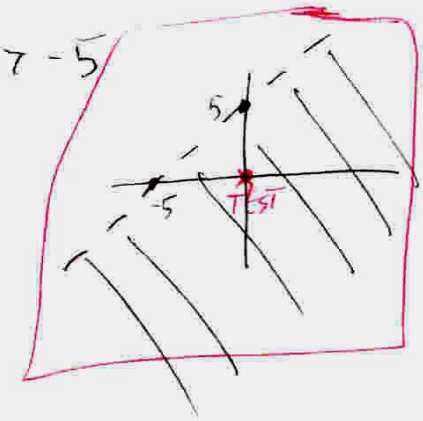
$-5 = 8 + b \Rightarrow b = -13$

$-8 \quad -8$

$f(x) = -2x - 13$

26. $x - y > -5$

x	y
0	5
-5	0



SINCE WE HAVE $>$, OUR LINE IS DOTTED. ($\geq$ WOULD BE SOLID)

TESTING $(0, 0)$, $0 - 0 > -5$

TRUE, SO

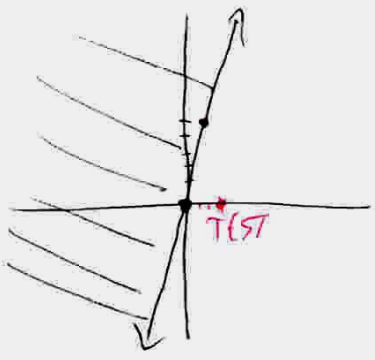
WE SHADE THE TEST POINT

27. $y \geq 5x \Rightarrow m = 5$, $b = 0$

$m = \frac{5}{1} = \frac{\text{RISE}}{\text{RUN}}$

$b = 0$ is y-intercept

$\geq \Rightarrow$ SOLID



TEST $(3, 0)$

$0 \geq 15$ FALSE.

DON'T SHADE TEST POINT.

SHADE OTHER SIDE

ANSWER KEY HAS A DOTTED LINE & IS INCORRECT

28. $x - y < -2$ in BLACK, $x > -5$ IN RED ANSWER IN GREEN

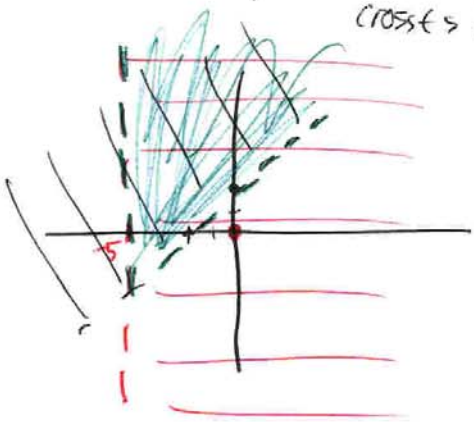
x	y
0	2
-2	0

HOLLOW

TEST (0,0) FALSE

CROSSES X @ -5, HOLLOW

TEST (0,0) TRUE



THIS IS AN **AND** PROBLEM, SO WE NEED POINTS SHADED BY **BOTH** LINES

29. $x + y \leq -3$ in BLACK $x - y \geq -2$ IN RED ANSWER IN GREEN

x	y
0	-3
-3	0

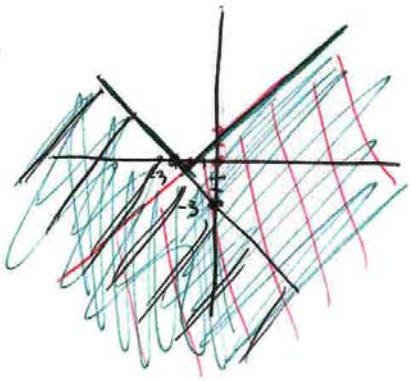
SOLID

TEST (0,0) FALSE

x	y
0	2
-2	0

SOLID

TEST (0,0) TRUE



THIS IS AN OR PROBLEM, SO WE NEED POINTS SHADED BY EITHER LINE.

30. $\begin{cases} x - 6y = -19 \\ 6x - 7y = -27 \end{cases}$

FOR SUBSTITUTION, WE NEED TO SOLVE FOR A VARIABLE, LIKE THE x IN THE FIRST: $x - 6y = -19 \Rightarrow \boxed{x = 6y - 19}$ (+6y, +6y)

NEXT, WE SUBSTITUTE THIS x INTO THE OTHER EQUATION:

$6(6y - 19) - 7y = -27$ *SOLVE

$36y - 114 - 7y = -27$

$29y - 114 = -27$ (+114, +114)

$29y = 87$

$\boxed{y = 3}$

NEXT, WE PLUG THIS VALUE BACK INTO OUR SOLVED EQUATION

$x = 6(3) - 19 = 18 - 19 = -1$

SO $\boxed{(-1, 3)}$ IS THE SOLUTION

31. $\begin{cases} 2x+y=6 \\ 3x+2y=8 \end{cases}$ $\cdot(-2)$

$\Rightarrow \quad -4x-2y=-12$

$+ \quad 3x+2y=8$

$-x = -4 \Rightarrow \boxed{x=4}$

BACK SUB INTO 1ST EQUATION $2(4)+y=6$

$8+y=6$

$-8 \quad -8$

$\boxed{y=-2}$

$\boxed{(4,-2)}$

32. $\begin{cases} \frac{3}{5}x+\frac{7}{10}y=\frac{47}{5} & \cdot 10 \\ 6x+2y=104 & \cdot \frac{1}{2} \end{cases}$

$\Rightarrow \quad 6x+7y=94$

$+ \quad -6x-2y=-104$

$\frac{5y}{5} = \frac{-10}{5}$

$\boxed{y=-2}$

1ST EQUN

$6x+2(-2)=104$

$6x-4=104$

$+4 \quad +4$

$\frac{6x}{6} = \frac{108}{6}$

$\boxed{x=18}$

$\boxed{(18,-2)}$

33. $\begin{cases} x-y+4z=15 \\ 2x+z=5 \\ x+3y+z=20 \end{cases}$

WE ALREADY HAVE 1 EQUATION WITH X & Z ONLY. WE NEED ANOTHER: 3R1 + R3

$3x-3y+12z=45$

$+ \quad x+3y+z=20$

$4x+13z=65$

$\begin{cases} 2x+z=5 \\ 4x+13z=65 \end{cases}$

$-2(2x+z=5) \Rightarrow -4x-2z=-10$

$+ \quad 4x+13z=65$

$\frac{11z}{11} = \frac{55}{11}$

$\boxed{z=5}$

$2x+(5)=5$

$-5 \quad -5$

$\frac{2x}{2} = \frac{0}{2}$

$\boxed{x=0}$

$(0)-y+4(5)=15$

$-y+20=15$

$-20 \quad -20$

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

$\boxed{y=5}$

$\boxed{(0,5,5)}$

ONE NUMBER IS 1 less than a second

$x = y - 1$

TWICE THE SECOND # IS 23 more than 5 times the first

$2y = 5x + 23$

$\begin{cases} x = y - 1 \\ 2y = 5x + 23 \end{cases}$

SUBSTITUTING x: $2y = 5(y-1) + 23$

$2y = 5y - 5 + 23 \Rightarrow 2y = 5y + 18$ (−18, −2y)

$\Rightarrow -3y = -18 \Rightarrow y = -6$ (÷3)

BACK SUB INTO EQUN 1: $x = (-6) - 1 = -7$

THE NUMBERS ARE -7 & -6

5. x = ml of 14% solution

y = ml of 30% solution

TOTAL ml of mixture is 160ml

SO $\boxed{x + y = 160}$

MIXTURE EQUATION IS OF THE FORM AMT(%) + AMT(%) = AMT(%)

SO $\boxed{.14x + .30y = .24(160)} \cdot 100$

$\Rightarrow 14x + 30y = 3840$ (÷2)

$\boxed{7x + 15y = 1920}$

$\begin{cases} 7x + 15y = 1920 \\ x + y = 160 \end{cases}$

ROW 2 by -7: $-7x - 7y = -1120$

ROW 1 : $+7x + 15y = 1920$

$8y = 800$ (÷8)

$y = 100$

$x + y = 160 \Rightarrow x + 100 = 160$ (−100, −100)

$x = 60$

60 ml of 14% solution,
100 ml of 30% solution

36. BREAK EVEN IS WHEN COST = REVENUE, SO

$172x + 313600 = 368x \Rightarrow 313600 = 196x$

$-172x \quad -172x \qquad \frac{313600}{196} = \frac{196x}{196}$

$\Rightarrow x = 1600$, so **1600 units**

37. H = # HOT DOGS,
P = # BAGS of POTATO CHIPS
D = # SOFT DRINKS

5 hot dogs, 5 bags & 3 drinks costs $20.75

so $\boxed{5H + 5P + 3D = 20.75}$

HOT DOGS ARE 1.25 MORE THAN BAGS of CHIPS

so $\boxed{H = P + 1.25} \Rightarrow H - P = 1.25$

SOFT DRINK is $3 less than 2 hot dogs

$\boxed{D = 2H - 3} \Rightarrow -2H + D = -3$

$$\begin{cases} 5H + 5P + 3D = 20.75 & R1 \\ H - P = 1.25 & R2 \\ -2H + D = -3 & R3 \end{cases}$$

NEXT WE GET A 2x2 SYSTEM. LET'S USE $H - P = 1.25$ as the 4th ROW.

TO GET ROW 5, ELIMINATE D. SO

$R1 - 3R3$:

$5H + 5P + 3D = 20.75 \leftarrow R1$

$+ 6H \quad - 3D = 9 \leftarrow -3R3$

$11H + 5P = 29.75$

$$\begin{cases} H - P = 1.25 & R4 \\ 11H + 5P = 29.75 & R5 \end{cases}$$

NEXT WE ELIMINATE H or P.

TO ELIMINATE P, $5R4 + R5$:

$5H - 5P = 6.25 \leftarrow 5R4$

$+ 11H + 5P = 29.75 \leftarrow R5$

$16H = 36 \Rightarrow \boxed{H = 2.25}$

$\frac{16H}{16} = \frac{36}{16}$

PLUG H INTO R4:

$2.25 - P = 1.25$

$-2.25 \quad -2.25$

$-P = -1$

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

$\boxed{P = 1}$

PLUG H INTO R3: (or H & P INTO R1)

$-2(2.25) + D = -3$

$-4.50 + D = -3$

$+4.50 \quad +4.50$

$\boxed{D = 1.50}$

So HOT DOGS COST $2.25
BAGS of CHIPS are $1.00
& DRINKS COST $1.50