Sec 2.1 – Solving Algebraic Equations

Name:

Find the value for the variable that makes the statement true. (SHOW WORK NEATLY)

1. $2y - 4 + 5y = 4 - 3y + 5$

$7y - 4 = 9 - 3y$
$+3y \qquad +3y$ ← y
$10y - 4 = 9$
$+4 \quad +4$ # →
$\frac{10y}{10} = \frac{13}{10}$
$\boxed{y = 1.3}$ ✓

2. $3g - 6 + 2g + 1 = 11 - 8g$

$5g - 5 = 11 - \cancel{8g}$
$+8g \qquad \cancel{+8g}$ ← g
$13g - \cancel{5} = 11$
$\cancel{+5} \quad +5$ # →
$\frac{13g}{13} = \frac{16}{13}$
$\boxed{g = 16/13}$

3. $\frac{-7x}{-7} = \frac{91}{-7}$

$\boxed{x = -13}$

$-7(-13) = 91$ ✓

4. $\frac{123}{3} = \frac{3m}{3}$

$\boxed{41 = m}$

5. $\frac{2}{3}x = 12$

$\frac{3}{1} \cdot \frac{2}{3}x = 3 \cdot 12$
$\frac{2x}{2} = \frac{36}{2}$
$\boxed{x = 18}$

6. $3x + 2 = 14$

$-2 \quad -2$
$\frac{3x}{3} = \frac{12}{3}$
$\boxed{x = 4}$ ✓

7. $2a - 6 = 5a$

$-2a \quad -2a$
$\frac{-6}{3} = \frac{3a}{3}$
$\boxed{-2 = a}$ ✓

8. $32 = -\cancel{8} - 10b$

$+8 \quad \cancel{+8}$
$\frac{40}{-10} = \frac{-10b}{-10}$
$\boxed{-4 = b}$

9. $3(m - 4) + 2m = 8$

$3m - 12 + 2m = 8$
$5m - \cancel{12} = 8$
$\cancel{+12} \quad +12$
$\frac{5m}{5} = \frac{20}{5}$
$\boxed{m = 4}$ ✓

10. $-2(h - 3) + 5h = 5(2 + h)$

$-2h + 6 + 5h = 10 + 5h$
$3h + 6 = 10 + 5h$
$-3h \qquad -3h$
$6 = \cancel{10} + 2h$
$-10 \quad \cancel{-10}$
$\frac{-4}{2} = \frac{2h}{2}$
$\boxed{-2 = h}$ ✓

I. Eliminate parenthesis by distributing.

Example
$$2(3x - 4) = 5$$
$$6x - 8 = 5$$

II. Eliminate fractions by multiplying each term by the lowest common denominator.

Example
$$\frac{1}{3}x - \frac{1}{2} = \frac{x}{4}$$
[redacted] $\cdot \frac{1}{3}x -$ [redacted] $\cdot \frac{1}{2} =$ [redacted] $\cdot \frac{x}{4}$
$$4x - 6 = 3x$$

III. Combine like terms on each side of the equation.

Example
$$4x + 2 - 7x = 2 + x + 8$$
$$-3x + 2 = 10 + x$$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example
$$3x + 2 = 6x - 5$$
$$-3x \qquad -3x$$
$$2 = 3x - 5$$
$$+5 \qquad +5$$
$$7 = 3x$$

V. Divide both sides by the coefficient (the number in front of the variable).

Example
$$4x = 12$$
$$\frac{4x}{4} = \frac{12}{4}$$
$$x = 3$$

11. $2(w-3)-2w=7$

$2w-6-2w=7$

$\cancel{0w}-6=7$

$-6=7$

FALSE STATEMENT

$\boxed{\varnothing \text{ EMPTY SET}}$

12. $3(2a+3)-2a=2(5+2a)-1$

$6a+9-2a=10+4a-1$

$4\cancel{a}+9=9+4\cancel{a}$

$-4a \qquad -4a$

$9=9$

TRUE STATEMENT

$\boxed{a = \text{ALL REAL NUMBERS } (\mathbb{R})}$

13. $\frac{1}{3}x+\frac{3}{2}-\frac{5}{6}x=3$

$\frac{6}{1}\cdot\frac{1}{3}x+\frac{6}{1}\cdot\frac{3}{2}-\frac{6}{1}\cdot\frac{5}{6}x=6\cdot3$

$\frac{6}{3} \quad \frac{18}{2} \quad \frac{30}{6} \quad 18$

$2x+9-5x=18$

$-3x+\cancel{9}=18$

$\quad -\cancel{9} \quad -9$

$\frac{-3x}{-3}=\frac{9}{-3}$

$\boxed{x=-3}$

14. $\frac{2}{5}(x-6)=\frac{5}{2}$

$\frac{2}{5}x-\frac{12}{5}=\frac{5}{2}$

$\frac{10}{1}\cdot\frac{2}{5}x-\frac{10}{1}\cdot\frac{12}{5}=\frac{10}{1}\cdot\frac{5}{2}$

$\frac{20}{5} \quad \frac{120}{5} \quad \frac{50}{2}$

$4x-24=25$

$\quad +24 \quad +24$

$\frac{4x}{4}=\frac{49}{4}$

$\boxed{x=\frac{49}{4}}$

15. $\frac{1}{2}x+\frac{3}{4}-\frac{5}{2}x=\frac{3}{4}+\frac{1}{4}x$

$\frac{4}{1}\cdot\frac{1}{2}x+\frac{4}{1}\cdot\frac{3}{4}-\frac{4}{1}\cdot\frac{5}{2}x=\frac{4}{1}\cdot\frac{3}{4}+\frac{4}{1}\cdot\frac{1}{4}x$

$\frac{4}{2} \quad \frac{12}{4} \quad \frac{20}{2} \quad \frac{12}{4} \quad \frac{4}{4}$

$2x+3-10x=3+x$

$-8x+3=3+x$

$+8x \qquad +8x$

$3=3+9x$

$-3 \quad -3$

$\frac{0}{9}=\frac{9x}{9}$

$\boxed{0=x}$

16. $2(2x-2)=1-\frac{5}{2}x+5$

$4x-4=1-\frac{5}{2}x+5$

$2\cdot4x-2\cdot4=2\cdot1-\frac{2\cdot5}{1\cdot2}x+2\cdot5$

$8x-8=2-5x+10$

$8x-8=12-\cancel{5x}$

$+5x \qquad \cancel{+5x}$

$13x-8=12$

$\quad +8 \quad +8$

$\frac{13x}{13}=\frac{20}{13}$

$\boxed{x=20/13}$

I. Eliminate parenthesis by distributing.

Example

$2(3x-4)=5$

$6x-8=5$

II. Eliminate fractions by multiplying each term by the lowest common denominator.

Example

$\frac{1}{3}x \quad - \quad \frac{1}{2} \quad = \quad \frac{x}{4}$

[redacted] $\cdot\frac{1}{3}x-$ [redacted] $\cdot\frac{1}{2}=$ [redacted] $\cdot\frac{x}{4}$

$4x \quad - \quad 6 \quad = 3x$

III. Combine like terms on each side of the equation.

Example

$4x+2-7x=2+x+8$

$-3x+2=10+x$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$3x+2=6x-5$

$-3x \qquad -3x$

$2=3x-5$

$+5 \qquad +5$

$7=3x$

V. Divide both sides by the coefficient (the number in front of the variable).

Example

$4x=12$

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

$x=3$

17. $3\left(\frac{1}{2}x-\frac{4}{6}\right)=\frac{5}{2}x+5$

$\frac{3}{2}x-2=\frac{5}{2}x+5$

$\frac{2}{1}\cdot\frac{3}{2}x-2\cdot 2=\frac{2}{1}\cdot\frac{5}{2}x+2\cdot 5$

$3x-4=5x+10$

$-3x \qquad -3x$

$-4=2x+10$

$-10 \qquad -10$

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

$\boxed{-7=x}$

18. $3t+\cancel{4x}=6-2x$ (solve for t)

$-\cancel{4x} \qquad -4x$

$\frac{3t}{3}=\frac{6-6x}{3}$

$t=\frac{6}{3}-\frac{6}{3}x$

$\boxed{t=2-2x}$

19. $2(x+2y)-2=3x+3$ (solve for y)

$\cancel{2x}+4y-2=3x+3$

$\cancel{-2x} \qquad -2x$

$4y-\cancel{2}=1x+3$

$\cancel{+2} \qquad +2$

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

$\boxed{y=\frac{x+5}{4}}$

or

$\boxed{y=\frac{x}{4}+\frac{5}{4}}$

20. $ax+\cancel{2b}=5b-c$ (solve for b)

$-\cancel{2b} \qquad -2b$

$ax=3b-c$

$+c \qquad +c$

$\frac{ax+c}{3}=\frac{3b}{3}$

$\boxed{\frac{ax+c}{3}=b}$

or

$\boxed{\frac{ax}{3}+\frac{c}{3}=b}$

21. If $3a+1-a=9$ then what is the value of $5a+2$?

$2a+1=9$

$-1 \quad -1$

$\frac{2a}{2}=\frac{8}{2}$

$\boxed{a=4}$

$5(4)+2$

$20+2$

$\boxed{22}$

VI. Eliminate parenthesis by distributing.

Example

$2(3x-4)=5$

$6x-8=5$

VII. Eliminate fractions by multiplying each term by the lowest common denominator.

Example

$\frac{1}{3}x-\frac{1}{2}=\frac{x}{4}$

[redacted] $\cdot\frac{1}{3}x-$ [redacted] $\cdot\frac{1}{2}=$ [redacted] $\cdot\frac{x}{4}$

$4x-6=3x$

VIII. Combine like terms on each side of the equation.

Example

$4x+2-7x=2+x+8$

$-3x+2=10+x$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$3x+2=6x-5$

$-3x \qquad -3x$

$2=3x-5$

$+5 \qquad +5$

$7=3x$

V. Divide both sides by the coefficient (the number in front of the variable).

Example

$4x=12$

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

$x=3$

FIND LCD

3, 6, 9, 12

2, 4, 6, 8

$$2\ \frac{\cancel{6}}{1}\ \frac{2x+1}{\cancel{3}_1} = \frac{x+1}{\cancel{2}_1}\ \frac{\cancel{6}\ 3}{1}$$

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

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

$$-3x \qquad -3x$$

$$1x + 2 = 3$$

$$-2 \qquad -2$$

$$\boxed{x = 1}$$

FIND LCD

3, 6, 9, 12, 15, ...

2, 4, 6, 8, ...

6, 12, 18, ...

23. $\frac{x+1}{3} + \frac{2x-1}{2} = \frac{3x-1}{6}$

$$\frac{{}^{2}\cancel{6}}{1}\ \frac{x+1}{\cancel{3}_1} + \frac{{}^{3}\cancel{6}}{1}\cdot\frac{2x-1}{\cancel{2}_1} = \frac{\cancel{6}}{1}\ \frac{3x-1}{\cancel{6}}$$

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

$$2x + 2 + 6x - 3 = 3x - 1$$

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

$$-3x \qquad -3x$$

$$5x - 1 = -1$$

$$+1 \qquad +1$$

$$\frac{5x}{5} = \frac{0}{5}$$

$$\boxed{x = 0}$$

24. $2^x = 64$

$$2^1 = 2$$

$$2^2 = 2\cdot 2 = 4$$

$$2^3 = 2\cdot 2\cdot 2 = 8$$

$$2^4 = 2\cdot 2\cdot 2\cdot 2 = 16$$

$$2^5 = 2\cdot 2\cdot 2\cdot 2\cdot 2 = 32$$

$$2^6 = 2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2 = 64$$

$$\boxed{x = 6}$$

25. $3^x = 243$

$$3^1 = 3$$

$$3^2 = 3\cdot 3 = 9$$

$$3^3 = 3\cdot 3\cdot 3 = 27$$

$$3^4 = 3\cdot 3\cdot 3\cdot 3 = 81$$

$$3^5 = 3\cdot 3\cdot 3\cdot 3\cdot 3 = 243 \checkmark$$

$$\boxed{x = 5}$$

26. $5^x = 125$

$$5^1 = 5$$

$$5^2 = 5\cdot 5 = 25$$

$$5^3 = 5\cdot 5\cdot 5 = 125$$

$$\boxed{x = 3}$$

Sec 2.3 – Solving Algebraic Inequalities

Name:

Find the values for the variable that makes the statement true. (SHOW WORK NEATLY)

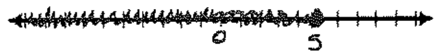
1. $\frac{3x}{3} > \frac{6}{3}$

$\boxed{x > 2}$

2. $\frac{20}{4} \geq \frac{4m}{4}$

$5 \geq m$

$\boxed{m \leq 5}$



3. $\frac{-3x}{-3} < \frac{12}{-3}$

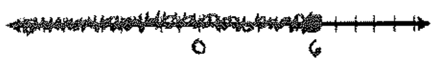
$\boxed{x > -4}$

4. $3b + 2 \leq 20$

$ -2 \quad -2$

$\frac{3b}{3} \leq \frac{18}{3}$

$b \leq 6$



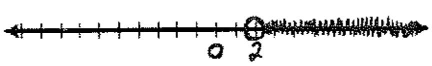
5. $8a - 12 > 2a$

$-8a \quad\quad -8a$

$\frac{-12}{-6} > \frac{-6a}{-6}$

$2 < a$

$\boxed{a > 2}$



6. $2p - 6 + 2p + 1 \leq 11 + 8p$

$4p - 5 \leq 11 + 8p$

$-4p \quad\quad\quad -4p$

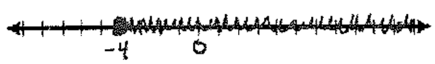
$-5 \leq 11 + 4p$

$-11 \quad -11$

$\frac{-16}{4} \leq \frac{4p}{4}$

$-4 \leq p$

$\boxed{p \geq -4}$



9. $8 \geq 3(m - 4) - 5m$

$8 \geq 3m - 12 - 5m$

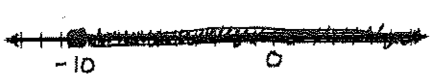
$8 \geq -2m - 12$

$+12 \quad\quad +12$

$\frac{20}{-2} \geq \frac{-2m}{-2}$

$-10 \leq m$

$\boxed{m \geq -10}$



10. $3x + \frac{3}{4} - \frac{1}{2}x > \frac{5}{2}$

$4 \cdot 3x + \frac{4 \cdot 3}{1 \cdot 4} - \frac{4 \cdot 1}{1 \cdot 2}x > \frac{4 \cdot 5}{1 \cdot 2}$

$12x + 3 - 2x > 10$

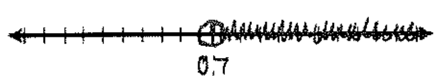
$10x + 3 > 10$

$ -3 \quad -3$

$\frac{10x}{10} > \frac{7}{10}$

$\boxed{x > 7/10}$

0.7



I. Eliminate parenthesis by distributing.

Example

$2(3x - 4) > 5$

$6x - 8 > 5$

II. Eliminate fractions by multiplying each term by the lowest common denominator.

Example

$\frac{1}{[redacted]}x - \frac{1}{[redacted]} \leq \frac{x}{[redacted]}$

$\frac{12}{1} \cdot \frac{1}{3}x - \frac{12}{1} \cdot \frac{1}{2} \leq \frac{12}{1} \cdot \frac{x}{4}$

$4x - 6 \leq 3x$

III. Combine like terms on each side of the equation.

Example

$4x + 2 - 7x > 2 + x + 8$

$-3x + 2 > 10 + x$

IV. Move the "variable" term to one side of the equation and the constants to the other side using addition or subtraction.

Example

$3x + 2 \geq 6x - 5$

$-3x \quad\quad -3x$

$2 \geq 3x - 5$

$+5 \quad\quad +5$

$7 \geq 3x$

V. Divide both sides by the coefficient (the number in front of the variable).

Example

$-4x > 12$

$\frac{-4x}{-4} \; ? \; \frac{12}{-4}$

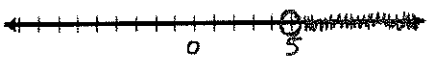
$x < 3$

Find the values for the variable that makes the statement true. (SHOW WORK NEATLY)

9. $2^x > 32$

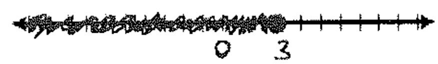
$2^1 = 2$ ✗
$2^2 = 2\cdot2 = 4$ ✗
$2^3 = 2\cdot2\cdot2 = 8$ ✗
$2^4 = 2\cdot2\cdot2\cdot2 = 16$ ✗
$2^5 = 2\cdot2\cdot2\cdot2\cdot2 = 32$ ✗
$2^6 = 2\cdot2\cdot2\cdot2\cdot2\cdot2 = 64$ ✓

$\boxed{x > 5}$



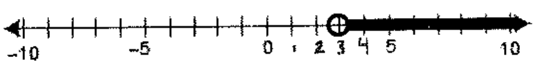
10. $5^x \leq 125$

$5^{-1} = \frac{1}{5}$ ✓
$5^0 = 1$ ✓
$5^1 = 5$ ✓
$5^2 = 5\cdot5 = 25$ ✓
$5^3 = 5\cdot5\cdot5 = 125$ ✓
$5^4 = 5\cdot5\cdot5\cdot5 = 625$ ✗



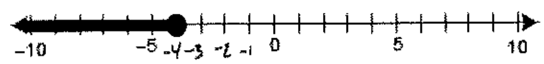
Write an inequality statement for each graph using *x*.

11.



$\boxed{x > 3}$

12.



$\boxed{x \leq -4}$

Solve the following inequalities for the requested variable.

13. $4x - 2y \geq 6 - 2x$ (solved for y)

$-4x \qquad -4x$

$\frac{-2y}{-2} \geq \frac{6 - 6x}{-2}$

$y \leq -3 + 3x$

$\boxed{y \leq 3x - 3}$

14. $3(a - b) + 5b < 8b - 12$ (solved for a)

$3a - 3b + 5b < 8b - 12$

$3a + 2b < 8b - 12$
$\quad -2b \qquad -2b$

$\frac{3a}{3} < \frac{6b - 12}{3}$

$\boxed{a < 2b - 4}$

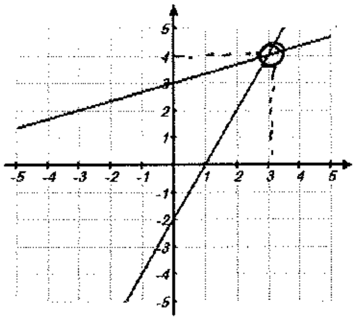
Sec 2.4 – Solving 2 Variable Systems by Graphing

Name:

Each system of equation is shown in graph. Using the graph find the solutions to each of the systems.

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

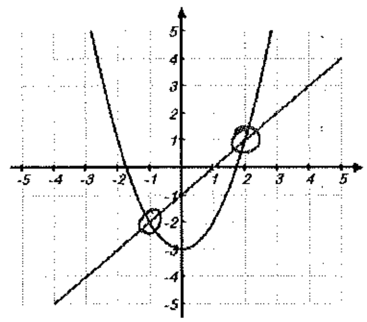
   $y = 2x - 2$



$(3, 4)$

2. $y = x^2 - 3$

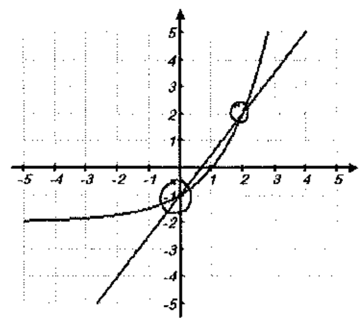
   $y = x - 1$



$(-1, -2)$ OR $(2, 1)$

3. $y = 2^x - 2$

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



$(0, -1)$ OR $(2, 2)$

Which of the system of equations below have a solution of $(-3, 2)$?

x y

4. $\begin{cases} y = 2x + 8 \\ 3x + 2y = -5 \end{cases}$

$(2) = 2(-3) + 8$
$2 = -6 + 8$ ✓
$3(-3) + 2(2) = -5$
$-9 + 4 = -5$ ✓

YES ✓ $(-3, 2)$

5. $\begin{cases} y = \frac{2}{3}x + 4 \\ x = \frac{1}{2}y - 2 \end{cases}$

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

$(-3) = \frac{1}{2}(2) - 2$
$-3 = 1 - 2$
$-3 = -1$ X

NO, NOT A SOLUTION

6. $\begin{cases} y + 2x = -4 \\ 3^y + x = 6 \end{cases}$

$(2) + 2(-3) = -4$
$2 + -6 = -4$
$-4 = -4$ ✓

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

YES $(-3, 2)$

Graph each system and use the graph to determine a solution.

7. $\begin{cases} y = \frac{1}{2}x - 4 \\ y + 2x = 1 \end{cases}$

$y = \frac{1}{2}x - 4$

RISE 1 / RUN 2 OR RISE −1 / RUN −2

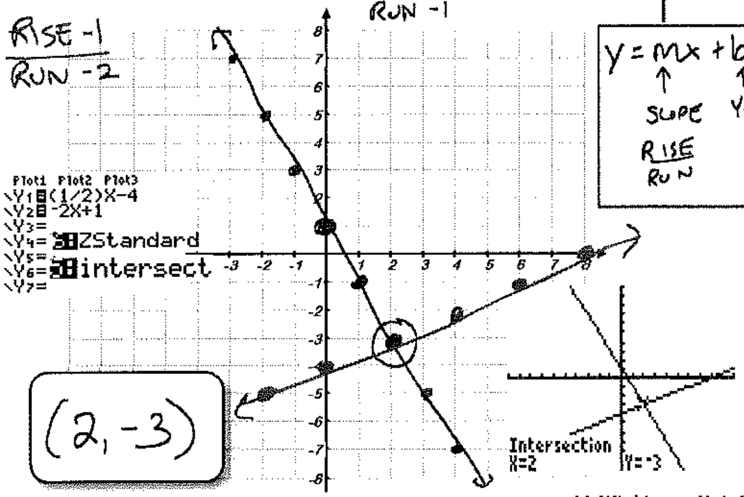
START AT −4 ON Y-AXIS

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

RISE −2 / RUN 1 OR RISE 2 / RUN −1

START AT 1 ON Y-AXIS

$y = mx + b$
↑ SLOPE ↑ Y-INT
$\frac{\text{RISE}}{\text{RUN}}$



$(2, -3)$

8. $\begin{cases} y = -3x - 6 \\ -2x + 3y = 15 \end{cases}$

$y = \frac{-3}{1}x - 6$

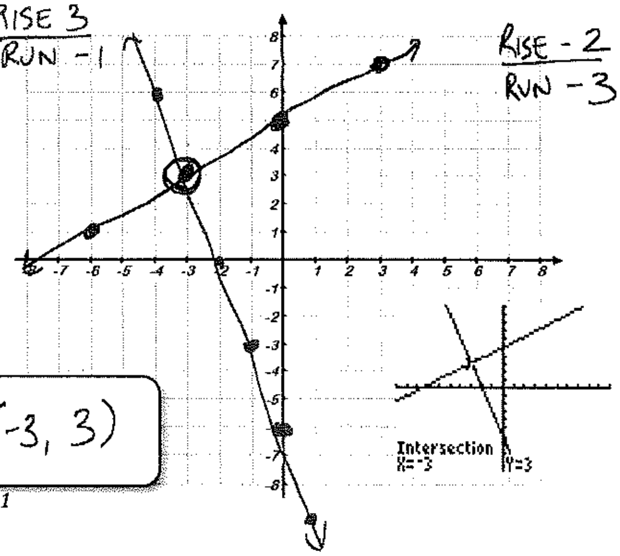
RISE −3 / RUN 1 OR RISE 3 / RUN −1

START AT −6 ON Y-AXIS

$-2x + 3y = 15$
$+2x \qquad\quad +2x$
$\frac{3y}{3} = \frac{2x + 15}{3}$
$y = \frac{2}{3}x + 5$

RISE 2 / RUN 3 — RISE −2 / RUN −3

START AT 5 ON Y-AXIS

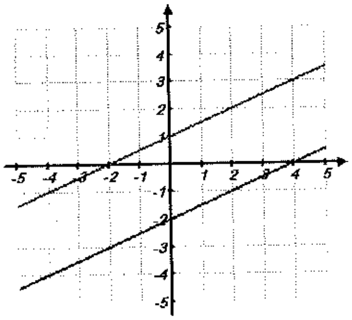


$(-3, 3)$

Each system of equation is shown in graph. How many solutions does each system have?

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

SAME SLOPE
DIFFERENT Y-INTERCEPT

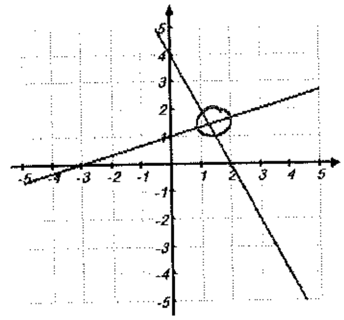


NO SOLUTIONS (INCONSISTENT)

$\varnothing$ EMPTY SET

10. $y = \frac{1}{3}x + 1$
$y = -2x + 4$

DIFFERENT SLOPE

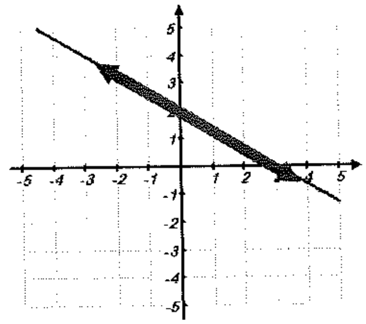


ONE SOLUTION
CONSISTENT INDEPENDENT

(1.3, 1.4)

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

SAME SLOPE
SAME Y-INTERCEPT



INFINITE SOLUTIONS
CONSISTENT DEPENDENT

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

Graph each system and use the graph to determine a solution.

9. $3y = 2x - 6$
$4x - 6y = 12$

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

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

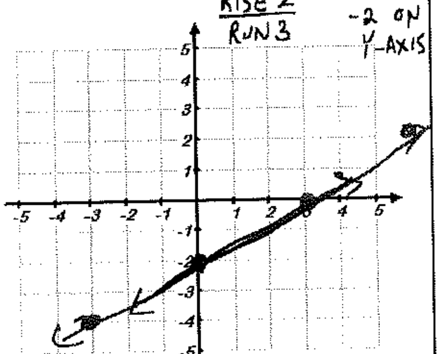
RISE 2 / RUN 3
START AT -2 ON Y-AXIS

$4x - 6y = 12$
$-4x \quad\quad -4x$

$\frac{-6y}{-6} = \frac{-4x + 12}{-6}$

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

RISE 2 / RUN 3
START AT -2 ON Y-AXIS



INFINITE SOLUTIONS

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

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

$-2x + 3y = -6$

$\{ 2x - 3y = 6 \}$ ← STANDARD FORM $Ax + By = C$

10. $4y - 7 = 2x + 1$
$2y - x = -6$

$4y - 7 = 2x + 1$
$+7 \quad\quad +7$

$\frac{4y}{4} = \frac{2x + 8}{4}$

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

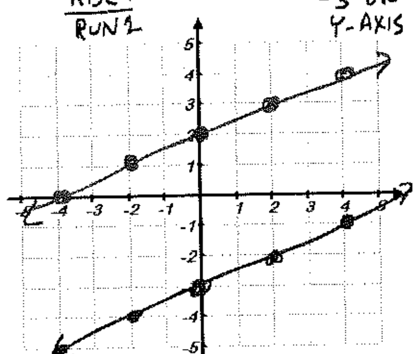
RISE 1 / RUN 2
START AT 2 ON Y-AXIS

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

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

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

RISE 1 / RUN 2
START AT -3 ON Y-AXIS



NO SOLUTIONS

$\varnothing$

EMPTY SETS

11. $2x = y + 2$
$3y = -2x + 9$

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

$2x - 2 = y$

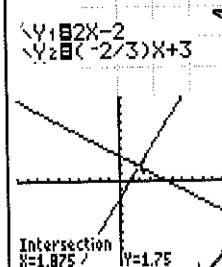
$y = 2x - 2$

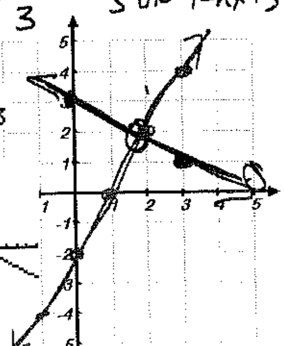
RISE 2 / RUN 1
START AT -2 ON Y-AXIS

$\frac{3y}{3} = \frac{-2x + 9}{3}$

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

RISE -2 / RUN 3
START AT 3 ON Y-AXIS





ONE SOLUTION

$(1.875, 1.75)$

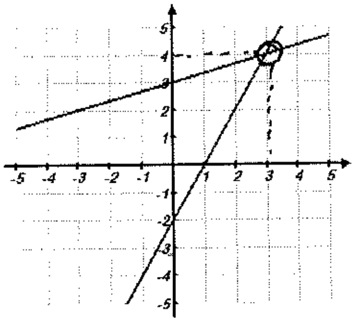
Sec 2.4 – Solving 2 Variable Systems by Graphing

Name:

Each system of equation is shown in graph. Using the graph find the solutions to each of the systems.

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

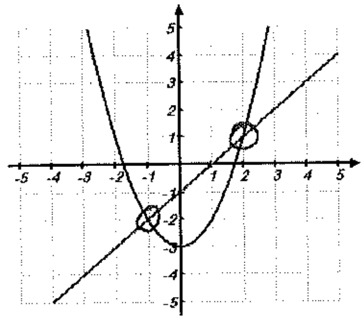
   $y = 2x - 2$



$\boxed{(3, 4)}$

2. $y = x^2 - 3$

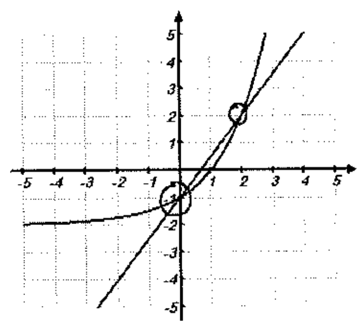
   $y = x - 1$



$\boxed{(-1, -2) \text{ or } (2, 1)}$

3. $y = 2^x - 2$

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



$\boxed{(0, -1) \text{ or } (2, 2)}$

Which of the system of equations below have a solution of $(\overset{x}{-3}, \overset{y}{2})$?

4. $\begin{cases} y = 2x + 8 \\ 3x + 2y = -5 \end{cases}$

$(2) = 2(-3) + 8$
$2 = -6 + 8$ ✓
$3(-3) + 2(2) = -5$
$-9 + 4 = -5$ ✓

YES ✓ (-3, 2)

5. $\begin{cases} y = \frac{2}{3}x + 4 \\ x = \frac{1}{2}y - 2 \end{cases}$

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

$(-3) = \frac{1}{2}(2) - 2$
$-3 = 1 - 2$
$-3 = -1$ X

NO, NOT A SOLUTION

6. $\begin{cases} y + 2x = -4 \\ 3^y + x = 6 \end{cases}$

$(2) + 2(-3) = -4$
$2 + -6 = -4$
$-4 = -4$ ✓

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

YES (-3, 2)

Graph each system and use the graph to determine a solution.

7. $\begin{cases} y = \frac{1}{2}x - 4 \\ y + 2x = 1 \end{cases}$

$y = \frac{1}{2}x - 4$

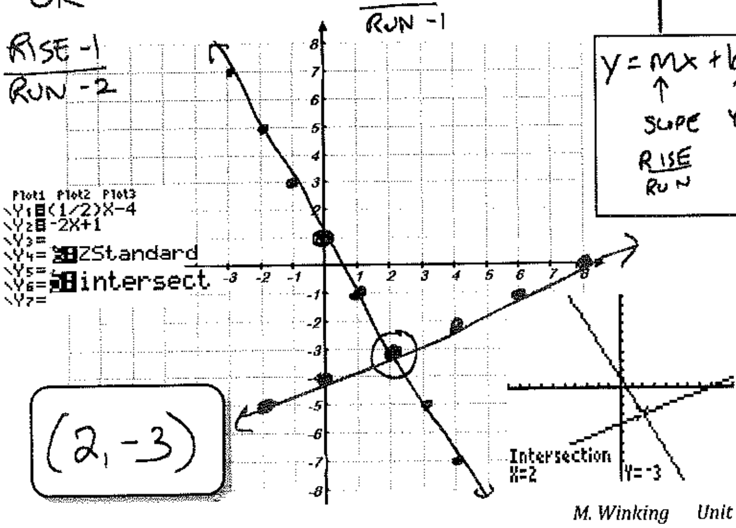
RISE 1 / RUN 2 OR RISE -1 / RUN -2

START AT -4 ON Y-AXIS

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

RISE -2 / RUN 1 OR RISE 2 / RUN -1

START AT 1 ON Y-AXIS



$\boxed{(2, -3)}$

$y = mx + b$

SLOPE = RISE / RUN, Y-INT

8. $\begin{cases} y = -3x - 6 \\ -2x + 3y = 15 \end{cases}$

$y = \frac{-3}{1}x - 6$

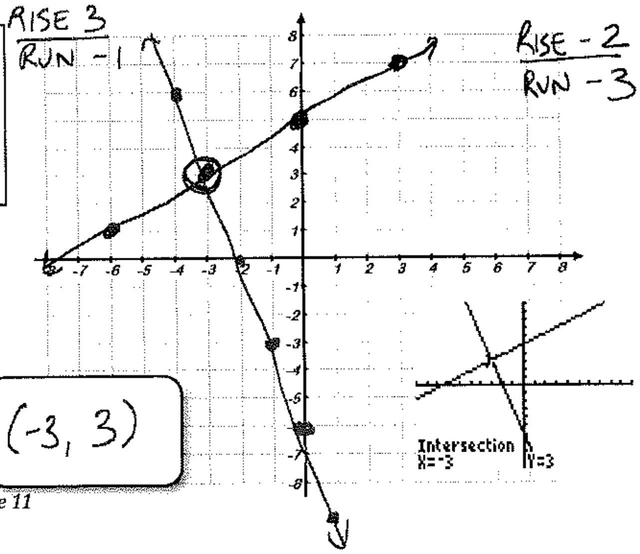
RISE -3 / RUN 1 OR RISE 3 / RUN -1

START AT -6 ON Y-AXIS

$-2x + 3y = 15$
$+2x \qquad +2x$
$\frac{3y}{3} = \frac{2x + 15}{3}$
$y = \frac{2}{3}x + 5$

RISE 2 / RUN 3 OR RISE -2 / RUN -3

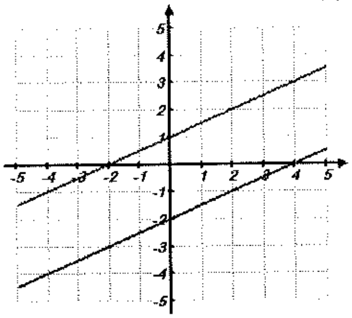
START AT 5 ON Y-AXIS



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

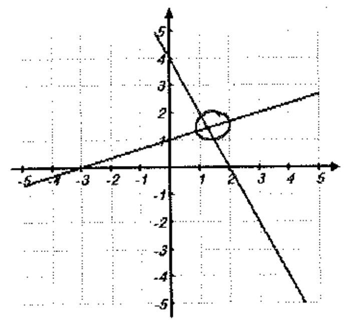
Each system of equation is shown in graph. How many solutions does each system have?

9. $y = \frac{1}{2}x - 2$ SAME SLOPE
$y = \frac{1}{2}x + 1$ DIFFERENT Y-INTERCEPT



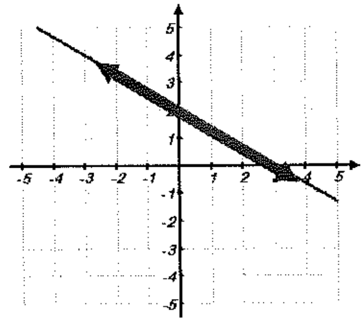
NO SOLUTIONS (INCONSISTENT) $\varnothing$ EMPTY SET

10. $y = \frac{1}{3}x + 1$ DIFFERENT SLOPE
$y = -2x + 4$



ONE SOLUTION CONSISTENT INDEPENDENT (1.3, 1.4)

11. $y = -\frac{2}{3}x + 2$ SAME SLOPE
$y = -\frac{2}{3}x + 2$ SAME Y-INTERCEPT



INFINITE SOLUTIONS CONSISTENT DEPENDENT $\{ y = -\frac{2}{3}x + 2 \}$

Graph each system and use the graph to determine a solution.

9. $3y = 2x - 6$
$4x - 6y = 12$

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

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

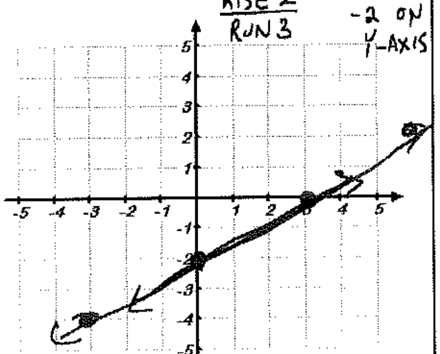
RISE 2 / RUN 3 START AT -2 ON Y-AXIS

$4x - 6y = 12$
$-4x \quad -4x$

$\frac{-6y}{-6} = \frac{-4x + 12}{-6}$

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

RISE 2 / RUN 3 START AT -2 ON Y-AXIS



INFINITE SOLUTIONS

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

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

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

$-2x + 3y = -6$ $\{ 2x - 3y = 6 \}$ ← STANDARD FORM $Ax + By = C$

10. $4y - 7 = 2x + 1$
$2y - x = -6$

$4y - 7 = 2x + 1$
$+7 \quad +7$

$\frac{4y}{4} = \frac{2x + 8}{4}$

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

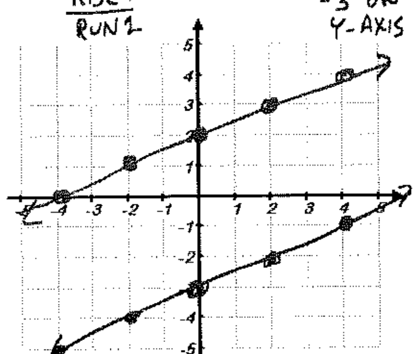
RISE 1 / RUN 2 START AT 2 ON Y-AXIS

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

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

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

RISE 1 / RUN 2 START AT -3 ON Y-AXIS



NO SOLUTIONS

$\boxed{\varnothing}$

EMPTY SETS

11. $2x = y + 2$
$3y = -2x + 9$

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

$2x - 2 = y$

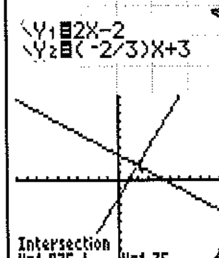
$y = 2x - 2$

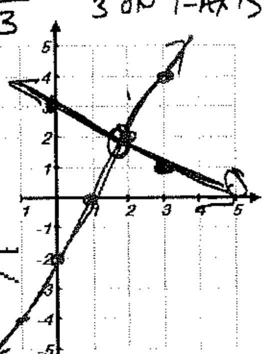
RISE 2 / RUN 1 START AT -2 ON Y-AXIS

$\frac{3y}{3} = \frac{-2x + 9}{3}$

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

RISE -2 / RUN 3 START AT 3 ON Y-AXIS





ONE SOLUTION

$\boxed{(1.875, 1.75)}$

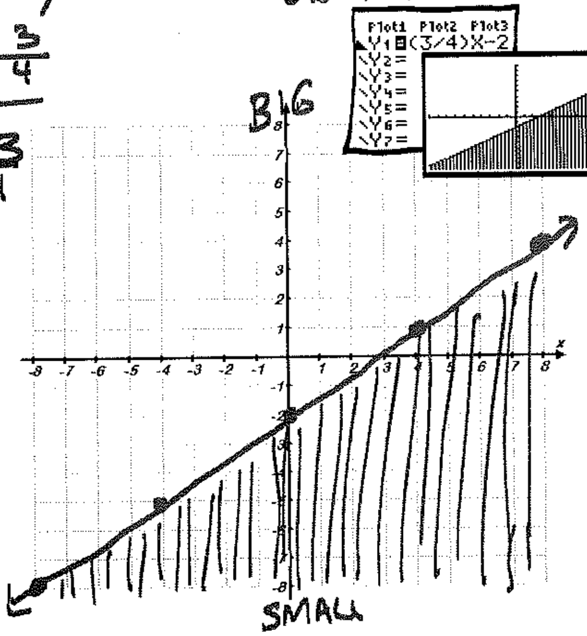
Sec 2-7 Systems of Inequalities

Name:

1. Graph the following inequalities:

a. $y \leq \frac{3}{4}x - 2$ ← START AT −2 ON Y-AXIS

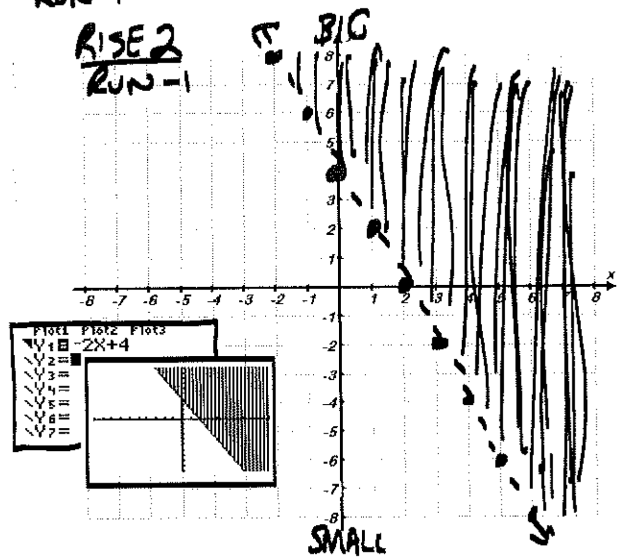
$\frac{\text{RISE } 3}{\text{RUN } 4}$ − OR − $\frac{\text{RISE } -3}{\text{RUN } -4}$



b. $y > -2x + 4$ ← START AT 4 ON Y-AXIS

$\frac{\text{RISE } -2}{\text{RUN } 1}$

$\frac{\text{RISE } 2}{\text{RUN } -1}$



c. $3y + 9x \geq 3x - 12$ ← FIRST, PUT IT IN SLOPE-INT FORM BY SOLVING FOR "Y"!

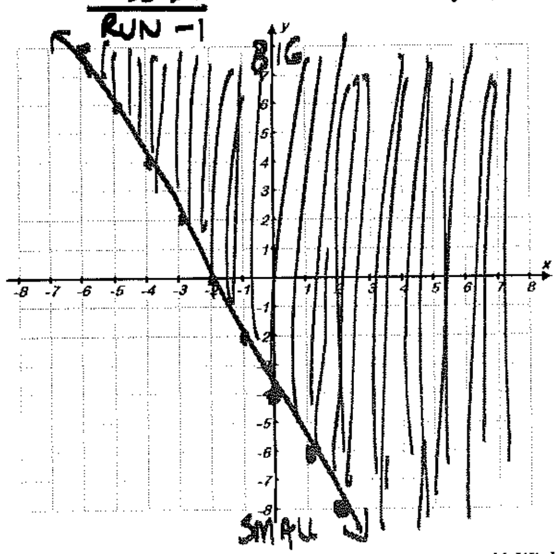
$$\underline{\quad -9x \quad -9x}$$

$$\frac{3y}{3} \geq \frac{-6x - 12}{3}$$

$$y \geq \frac{-2}{1}x - 4$$

$\frac{\text{RISE } -2}{\text{RUN } 1}$ OR $\frac{\text{RISE } 2}{\text{RUN } -1}$

START AT −4 ON Y-AXIS

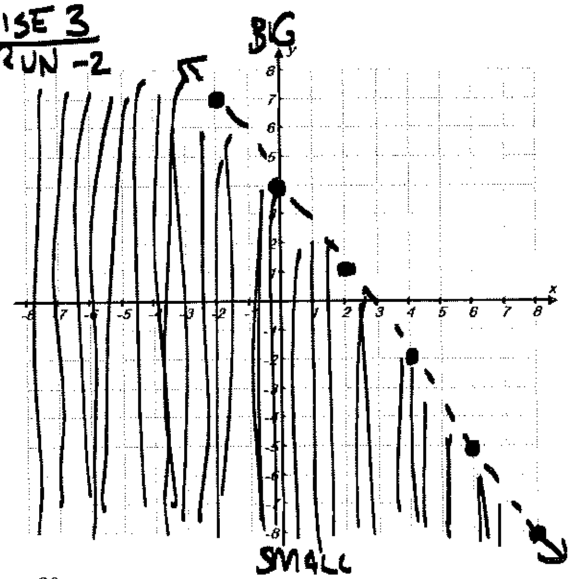


d. $\frac{3x - 8}{-2} < \frac{-2y}{-2}$ → SINCE WE DIVIDED BOTH SIDES BY A NEGATIVE, WE NEED TO FLIP THE INEQUALITY.

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

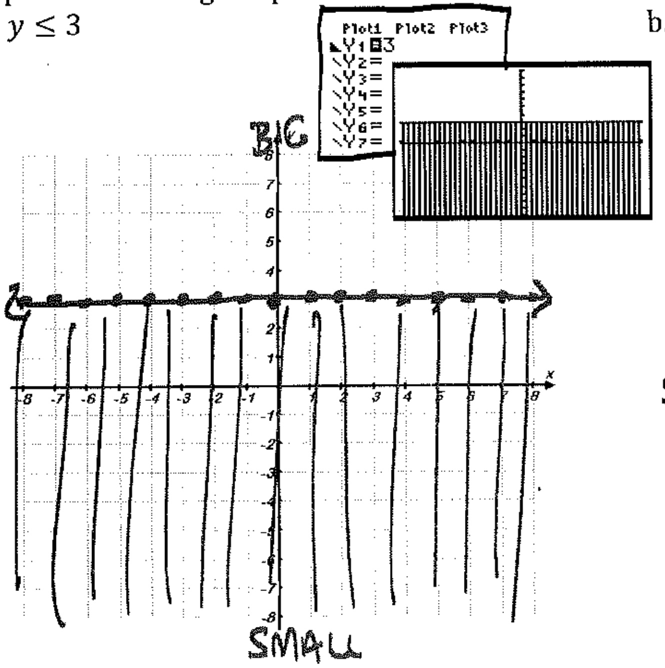
START AT 4 ON Y-AXIS

$\frac{\text{RISE } -3}{\text{RUN } 2}$ OR $\frac{\text{RISE } 3}{\text{RUN } -2}$

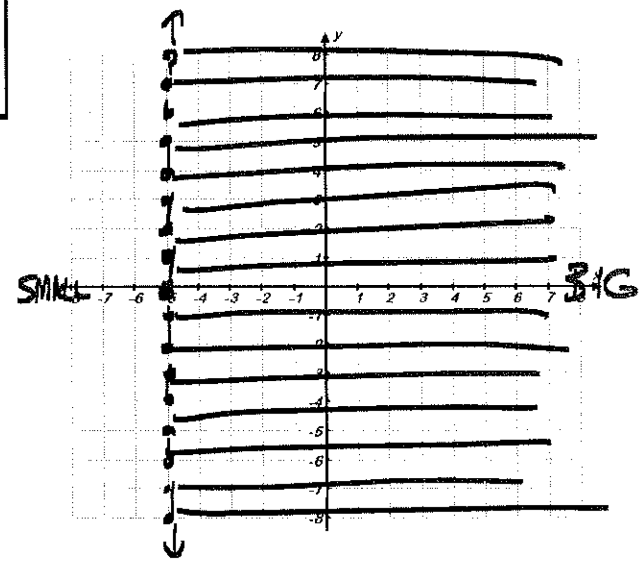


2. Graph the following inequalities:

a. $y \le 3$



b. $x > -5$



3. Graph the following systems inequalities:

a. $y > \frac{1}{2}x - 4$ ← START AT -4 ON Y-AXIS

$\frac{\text{RISE } 1}{\text{RUN } 2}$ OR $\frac{\text{RISE } -1}{\text{RUN } -2}$

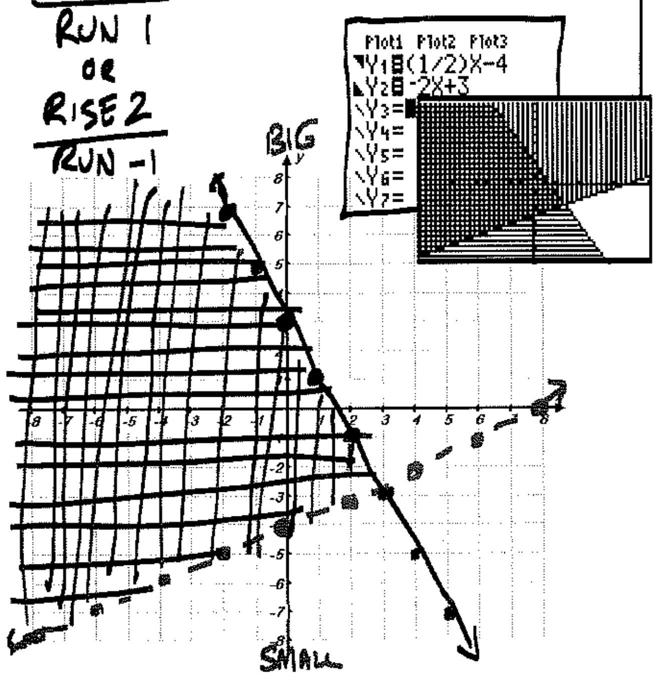
$-2x \ge y - 3$

$+3 \quad +3$

$-2x + 3 \ge y$

START AT 3 ON Y-AXIS

$\frac{\text{RISE } -2}{\text{RUN } 1}$ OR $\frac{\text{RISE } 2}{\text{RUN } -1}$



b. $3y + 2x \le 6$

$3y > y - 4$

$-y \quad -y$

$\frac{2y}{2} > \frac{-4}{2}$

$y > -2$

$3y + 2x \le 6$

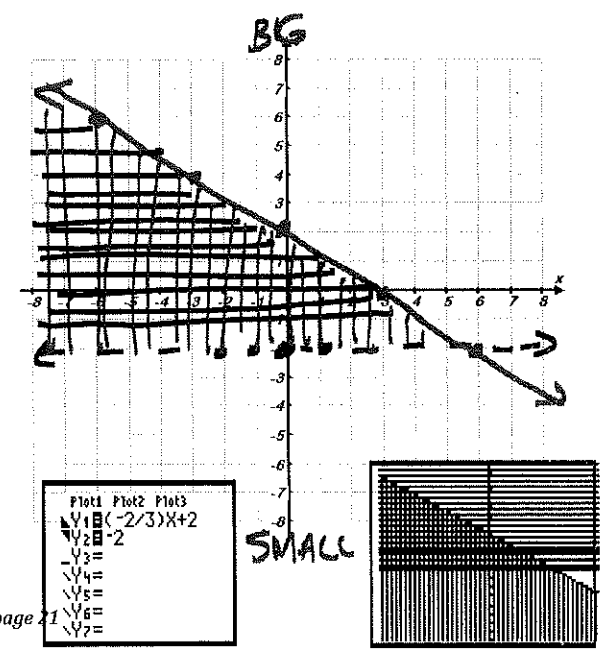
$-2x \quad -2x$

$\frac{3y}{3} \le \frac{-2x+6}{3}$

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

$\frac{\text{RISE } -2}{\text{RUN } 3}$ START AT 2 ON Y-AXIS

$\frac{\text{RISE } 2}{\text{RUN } -3}$

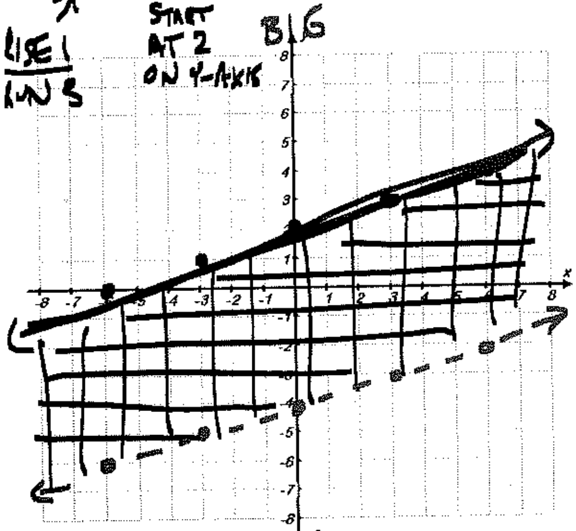


• IF 4 b IS AN "AND" STATEMENT THEN THE ANSWER SHOULD BE $\emptyset$ OR AN EMPTY GRAPH.

4. Graph the following systems inequalities:

a. $y > \frac{1}{3}x - 4$ ← START AT −4 ON Y-AXIS; $\frac{\text{RISE } 1}{\text{RUN } 3}$

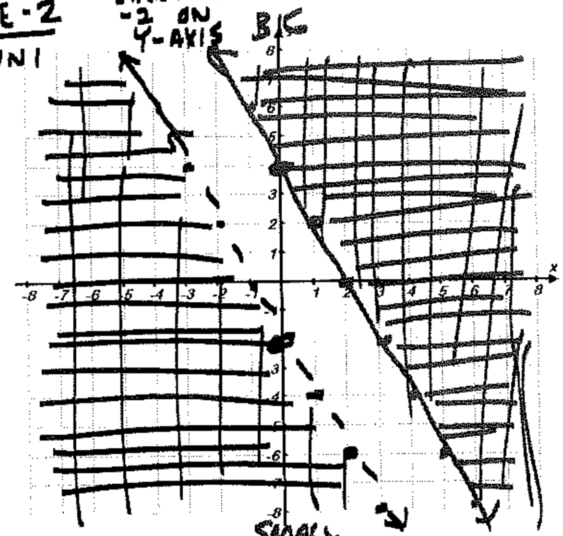
$y \leq \frac{1}{3}x + 2$ ← START AT 2 ON Y-AXIS; $\frac{\text{RISE } 1}{\text{RUN } 3}$



b. $y \geq -2x + 4$ ← START AT 4 ON Y-AXIS; $\frac{\text{RISE } -2}{\text{RUN } 1}$ OR $\frac{\text{RISE } 2}{\text{RUN } -1}$

— OR —

$y < -2x - 2$ ← START AT −2 ON Y-AXIS; $\frac{\text{RISE } -2}{\text{RUN } 1}$



5. Mary works at two part-time jobs. The first job at Bull's Eye pays $12 per hour and her second job at CSV pays $10 per hour. She must earn at least $360 a week to pay her bills.

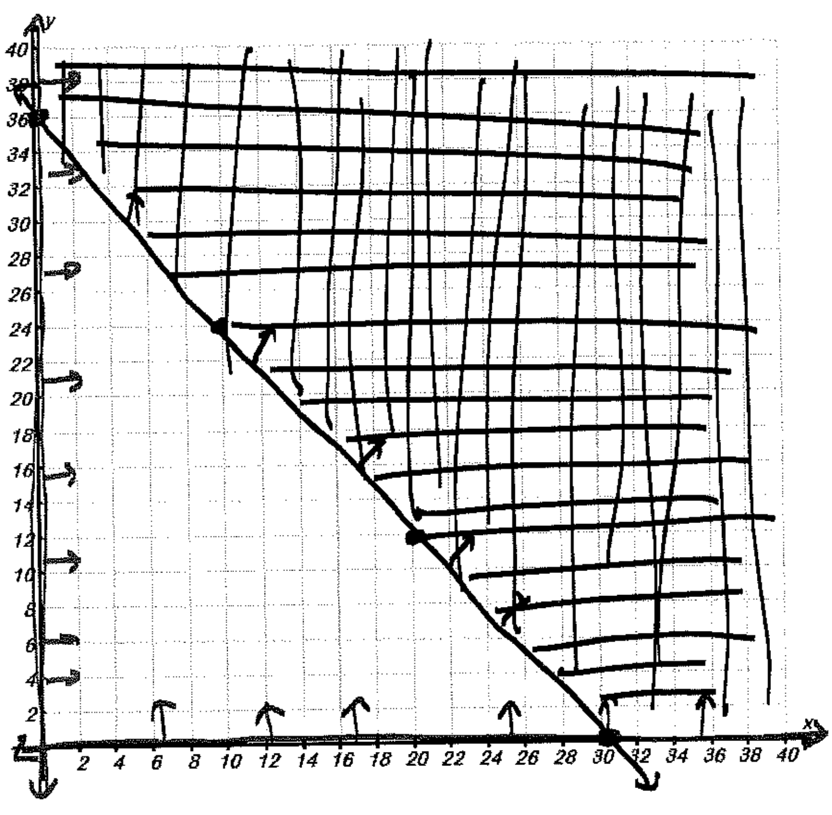
a. Write an inequality that shows how much she could work at each job to earn at least $360 per week. Let 'x' be the number of hours she works at Bull's Eye and 'y' be the number of hours she works at CSV.

$$12x + 10y \geq 360$$
$$-12x \qquad -12x$$
$$\frac{10y}{10} \geq \frac{-12x + 360}{10}$$
$$y \geq -\frac{6}{5}x + 36$$

b. Write base inequalities suggesting that she must work zero hours or more at each job.

$x \geq 0 \quad y \geq 0$

c. Graph the system of inequalities to show the possible number of hours she could work at each job.



6. Marco is the activities director at the local boys club. He needs to purchase new sports equipment, and he would like to purchase new basketballs and new soccer balls. He has $450 in his equipment budget and he would like to buy at least 15 balls. Soccer balls are $15 each and basketballs are $30 each.

a. Write an inequality that shows he can't spend more than $450. Let 'x' represent the number of basketballs and 'y' represent the number of soccer balls

$30x + 15y \leq 450$

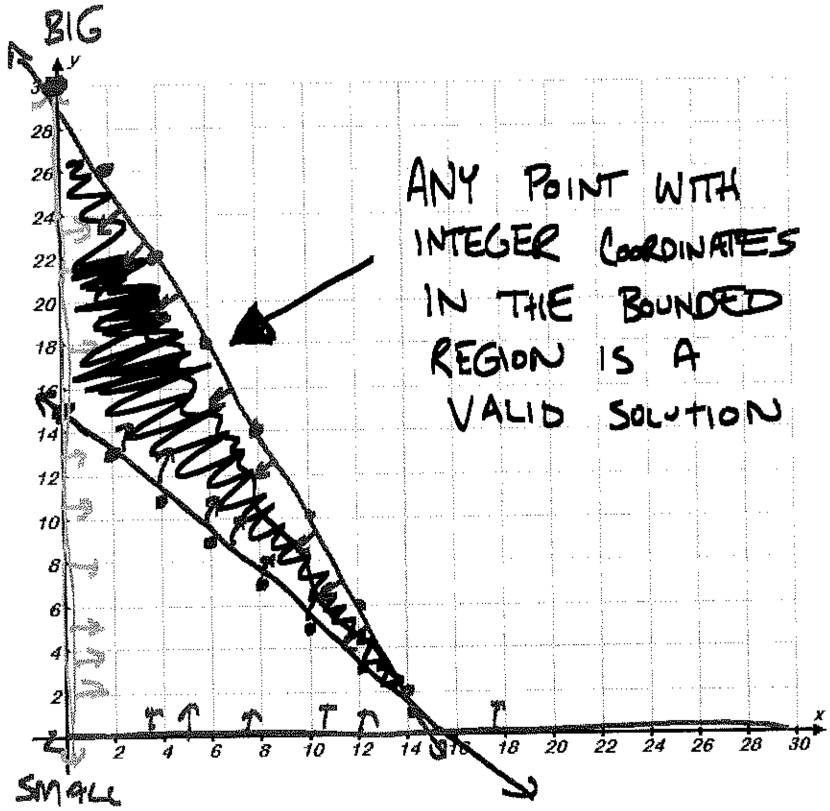
b. Write an equation that shows he needs at least 15 balls.

$x + y \geq 15$

c. Write base inequalities

$x \geq 0 \qquad y \geq 0$

d. Graph the system of inequalities



$30\cancel{x} + 15y \leq 450$
$-\cancel{30}x \qquad -30x$

$\frac{15y}{15} \leq \frac{-30x + 450}{15}$

$y \leq -2x + 30$

$\frac{\text{RISE } -2}{\text{RUN } 1}$ START AT 30 ON Y-AXIS

$x + y \geq 15$
$-x \qquad -x$

$y \geq -x + 15$

$\frac{\text{RISE } -1}{\text{RUN } 1}$ START AT 15 ON Y-AXIS

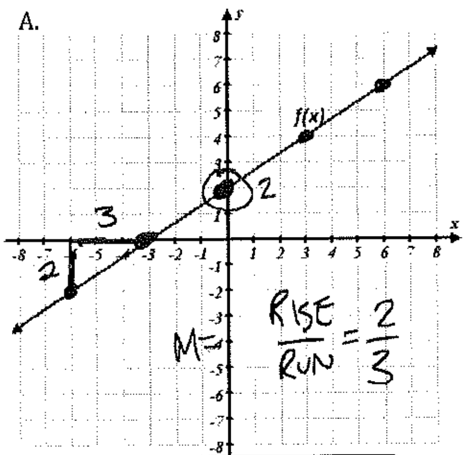
Coordinate Algebra I

Sec 2.9 – Functions

Building Linear & Exponential Functions Name:

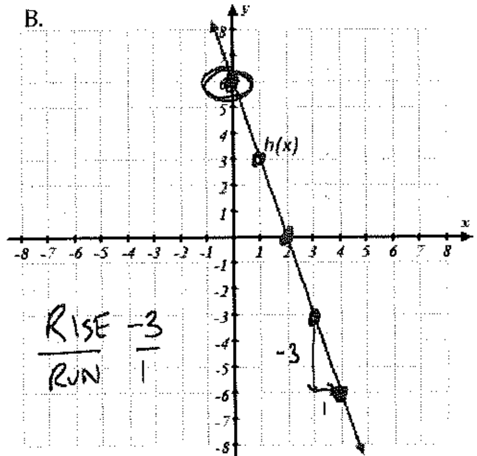
1. Write an equation to describe each **linear function** graphed below.

A.



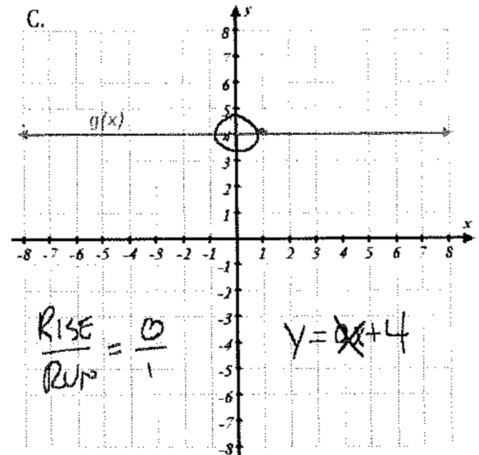
$f(x) = \frac{2}{3}x + 2$

B.



$h(x) = \frac{-3}{1}x + 6$

C.



$g(x) = 4$

2. Write an equation to describe each **linear function** graphed below.

A. The linear function, *f(x)*, has a slope of ½ and a y-intercept of 4.

$M = 1/2$

$b = 4$

$y = mx + b$

$f(x) = mx + b$

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

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

B. The linear function, *g(x)*, passes through the point (3,1) and has a slope of ⅔.

$M = 2/3$

$g(x) = mx + b$

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

TEST $(3,1)$ TO FIND "b"

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

$1 = 2 + b$

$1 = 2 + b$
$\;\;-2 \;\; -2$

$-1 = b$

$g(x) = \frac{2}{3}x - 1$

C. The linear function, *h(x)*, passes through the points (2, 4) and (6, 2).

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

$M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-4}{6-2} = \frac{-2}{4} = -\frac{1}{2}$

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

TEST (2,4) TO FIND "b"

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

$4 = -1 + b$
$+1 \quad +1$

$5 = b$

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

D. The linear function, *p(x)*, is parallel to the function $t(x) = \frac{1}{4}x + 2$ and passes through the point (8, 1).

$M = \frac{1}{4}$

$\parallel m = \frac{1}{4}$

$P(x) = \frac{1}{4}x + b$

TEST (8,1) TO FIND "b"

$(1) = \frac{1}{4}(8) + b$

$1 = \cancel{\tfrac{8}{4}}\,2 + b$
$-2 \quad -2$

$-1 = b$

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

3. Write an equation to describe each **linear function** graphed below.

A. Determine an equation that describes $d(x)$ based on the partial set of values in the table below.

x	−2	0	2	4	6
$d(x)$	1	2	3	4	5

RATE OF CHANGE IS CONSTANT SO IT'S LINEAR

$(x_1, y_1) = (0, 2)$ $\quad (x_2, y_2) = (2, 3)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-2}{2-0} = \frac{1}{2}$

$y = mx + b$

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

TEST (0, 2)

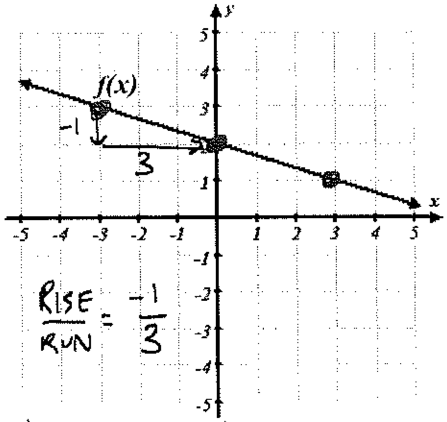
$(2) = \frac{1}{2}(0) + b$

$2 = 0 + b$

$2 = b$

$\boxed{d(x) = \frac{1}{2}x + 2}$

B. Determine an equation that describes $m(x)$, given that $m(x)$, is parallel to $f(x)$ *(shown in the graph at the right)* and it passes through the point (3, −2).



$\frac{RISE}{RUN} = \frac{-1}{3}$

$\parallel m = -\frac{1}{3}$

$y = mx + b$

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

TEST (3, −2) TO FIND "b"

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

$-2 = -1 + b$

$+1 \quad +1$

$-1 = b$

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

4. Consider the **exponential function**, $f(x) = 2^x$.

A. Fill in the missing values in the table below.

x	$f(x)$
3	8
0	1
2	4
1	2
−1	0.5
−3	0.125

$f(3) = 2^3 = 2 \cdot 2 \cdot 2 = 8$

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

$f(2) = 2^2 = 4$

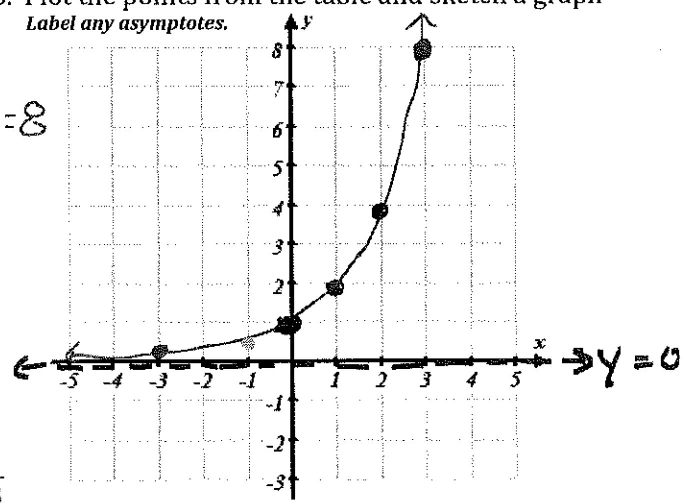
$f(1) = 2^1 = 2$

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

$f(-3) = \frac{2^{-3}}{1} = \frac{1}{2^3} = \frac{1}{8}$

B. Plot the points from the table and sketch a graph

Label any asymptotes.



5. Consider the **exponential function**, $g(x) = 3^x - 2$.

ASYMPTOTE $y = -2$

A. Fill in the missing values in the table below.

x	$g(x)$
2	7
3	25
1	1
0	−1
−1	$-1.\overline{6}$
−3	−1.96

$f(2) = 3^2 - 2 = 9 - 2 = 7$

$f(3) = 3^3 - 2 = 27 - 2 = 25$

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

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

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

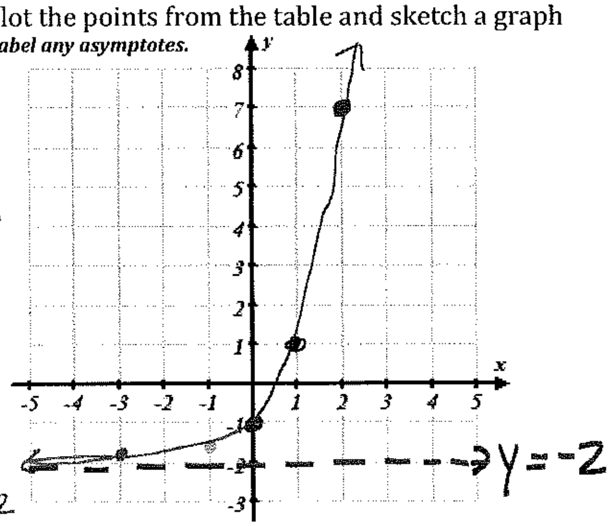
$f(-3) = 3^{-3} - 2 = \frac{1}{3^3} - 2 = \frac{1}{27} - 2$

```
3^-3-2
     -1.962962963
```

$= \frac{-53}{27}$

B. Plot the points from the table and sketch a graph

Label any asymptotes.

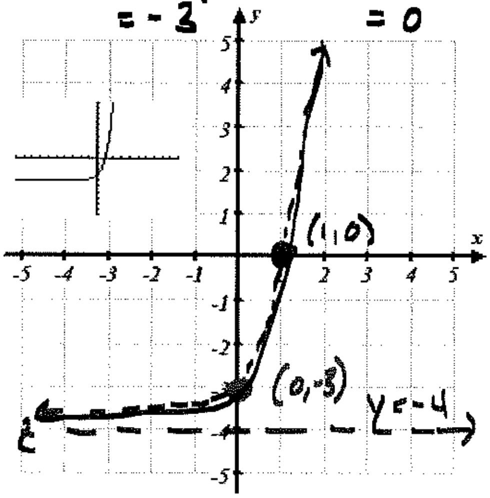


$\frac{1}{27} - \frac{2 \cdot 27}{1 \cdot 27} = \frac{1}{27} - \frac{54}{27} = \frac{-53}{27}$

6. For each of the functions, determine the asymptote and sketch a graph (label the points when x = 0 and when x = 1.)

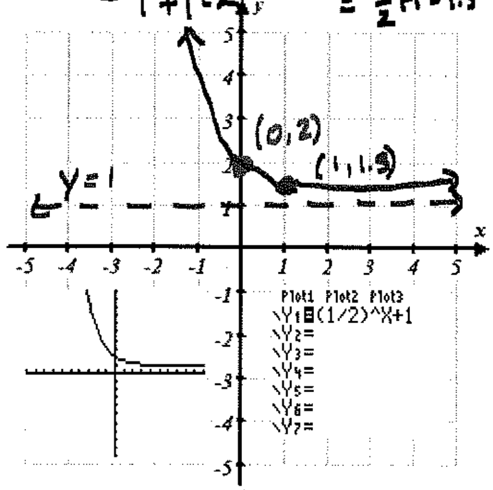
A. $f(x) = 4^x - 4$ ← ASY. $y = -4$

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



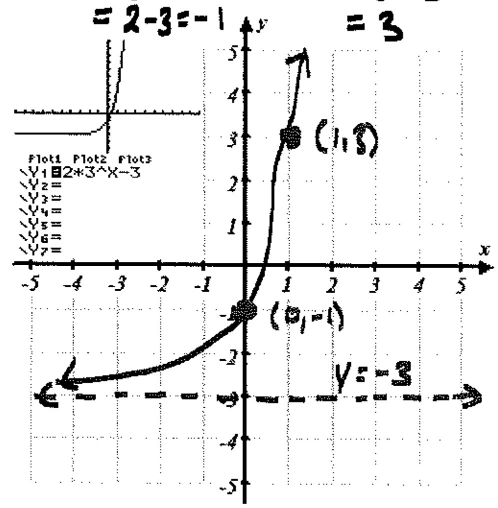
B. $g(x) = \left(\frac{1}{2}\right)^x + 1$ ← ASYMPTOTE $y=1$

$g(0) = \left(\frac{1}{2}\right)^0 + 1 = 1 + 1 = 2$ $g(1) = \left(\frac{1}{2}\right)^1 + 1 = \frac{1}{2} + 1 = 1.5$



C. $h(x) = 2 \cdot 3^x - 3$ ← ASY $y = -3$

$h(0) = 2 \cdot 3^0 - 3 = 2 \cdot 1 - 3 = 2 - 3 = -1$ $h(1) = 2 \cdot 3^1 - 3 = 6 - 3 = 3$



7. Create two different exponential functions of the form $f(x) = a \cdot b^x + c$ that have a horizontal asymptote at $y = 2$.

$f(x) = 4 \cdot 3^x + 2$ $g(x) = 1 \cdot (1/2)^x + 2$

8. Given the function $f(x)$ is of the form $f(x) = a \cdot b^x + c$, has a horizontal asymptote at $y = 2$, and passes through the point (0,5), create a possible function for $f(x)$.

$f(x) = a \cdot b^x + 2$

$f(x) = a \cdot 2^x + 2$

TEST (0,5)

$5 = a \cdot 2^0 + 2$

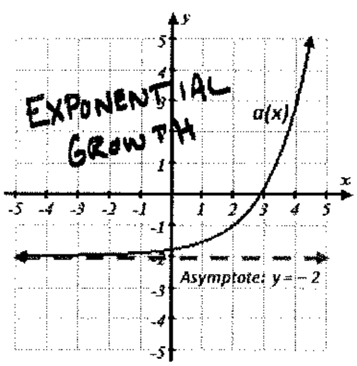
$5 = a + 2$

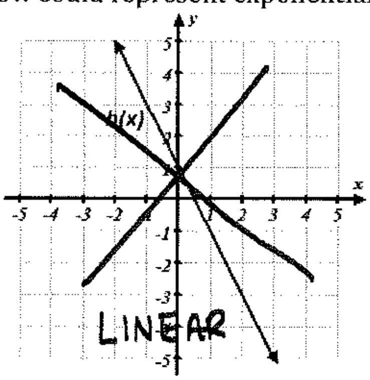
$-2 \quad -2$

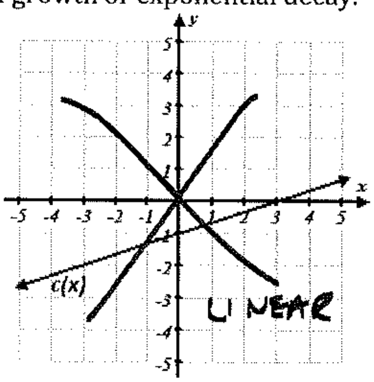
$3 = a$

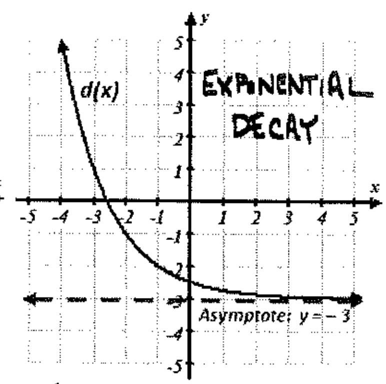
$\boxed{f(x) = 3 \cdot 2^x + 2}$

9. Tell which functions below could represent exponential growth or exponential decay.









LINEAR

~~x~~	0	1	2	3	5
f(x)	3	5	7	9	13

1 1 1 2

2 2 2 4

CONSTANT RATE

x	1	2	3	4	5
g(x)	65	33	17	9	5

1 1 1 1

-32 -16 -8 -4

EXPONENTIAL DECAY

x	1	2	3	4	5
h(x)	3	7	19	55	163

1 1 1 1

4 12 36 108

EXPONENTIAL GROWTH

~~$j(x) = 4x + 2$~~ LINEAR

$k(x) = 192 \cdot (0.5)^x + 8$ EXPONENTIAL DECAY — PARAMETER IS BETWEEN 0 AND 1

$m(x) = 3 \cdot (1.5)^x + 2$ EXPONENTIAL GROWTH — PARAMETER IS GREATER THAN 1

~~$n(x) = -\frac{1}{2}x + 6$~~ LINEAR

10. In a science experiment, a student is measuring the height of a plant each week. The student began the project on week 0 with the plant already 4 inches tall. The student determined that the plant would increase in height by 20% each week (for the first 10 weeks). Create an exponential function of the form $f(t) = a \cdot b^t$ that describes the height of the plant as a function of t, where t is the number of weeks after the project began.

$f(x) = 4 \cdot (1.20)^t$

(11) PLANT THAT STARTED AT 5 INCHES & GREW BY 40% EACH WEEK

$$f(x) = 5 \cdot (1.40)^x$$

"DO"MAIN **Sec 2.10 – Functions Domain and Range** RANG"E" Name:

1. What is the **domain** and **range** of the function described by the set of points: $\{(3,5),(2,6),(-5,3)(-7,1),(2,6)\}$

DOMAIN: $\{-7, -5, 2, 3\}$

RANGE: $\{1, 3, 5, 6\}$

2. Given $f(x) = \frac{1}{2}x + 6$ and its **domain** is described by the set $\{6,-8,4,2\}$ what is the range?

$f(6) = \frac{1}{2}(6) + 6 = 3+6 = 9$

$f(-8) = \frac{1}{2}(-8) + 6 = -4+6 = 2$

$f(4) = \frac{1}{2}(4) + 6 = 2+6 = 8$

$f(2) = \frac{1}{2}(2) + 6 = 1+6 = 7$

RANGE: $\{2, 7, 8, 9\}$

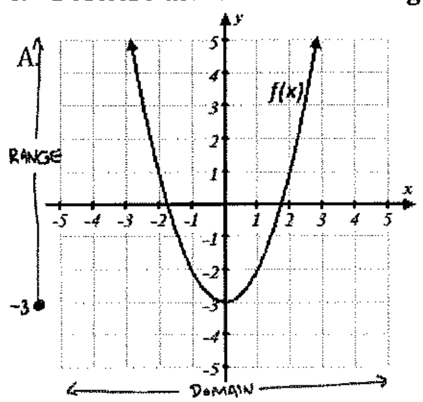
3. Given $f(x) = 2x - 1$ and its **range** is described by the set $\{5,-3,1,9\}$ what is the domain?

$2x-1=5$	$2x-1=-3$	$2x-1=1$	$2x-1=7$
$+1 \quad +1$	$+1 \quad +1$	$+1 \quad +1$	$+1 \quad +1$
$\frac{2x}{2} = \frac{6}{2}$	$\frac{2x}{2} = \frac{-2}{2}$	$\frac{2x}{2} = \frac{2}{2}$	$\frac{2x}{2} = \frac{10}{2}$
$x=3$	$x=-1$	$x=1$	$x=5$

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

4. Describe the **domain** and **range** and label the x and y – intercepts on the graphs of the following graphed functions:

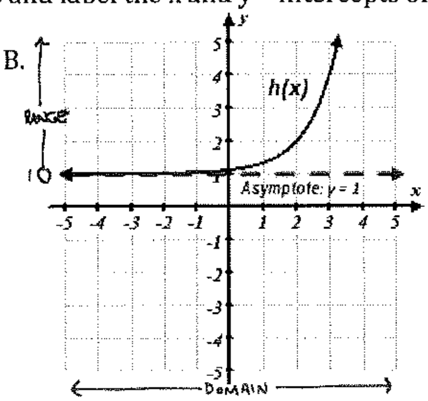
A.



LEFT & RIGHT → **Domain:** ALL REALS ($\mathbb{R}$) ← SET NOT.
$(-\infty, \infty)$ ← INTERVAL NOT.

DOWN & UP → **Range:** $y \geq -3$ ← SET NOTATION
$[-3, \infty)$ ← INTERVAL NOT.

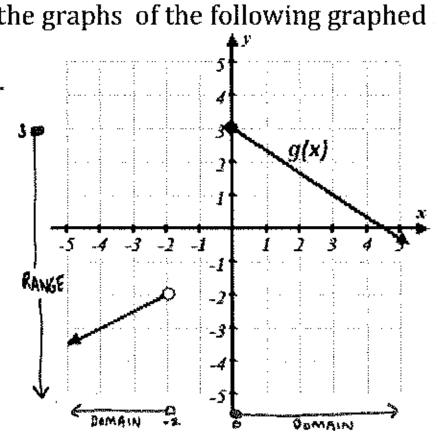
B.



Domain: ALL REALS ($\mathbb{R}$) ← SET
$(-\infty, \infty)$ ← INTERVAL

Range: $y > 1$ ← SET
$(1, \infty)$ ← INTERVAL

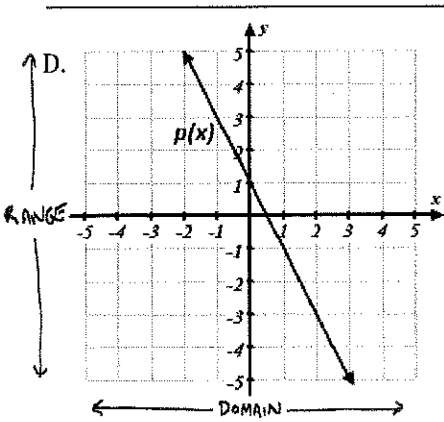
C.



Domain: $x < -2$ OR $x \geq 0$ ← SET NOTATION
$(-\infty, -2) \cup [0, \infty)$ ← INTERVAL NOT.

Range: $y \leq 3$ ← SET NOTATION
$(-\infty, 3]$ ← INTERVAL NOT.

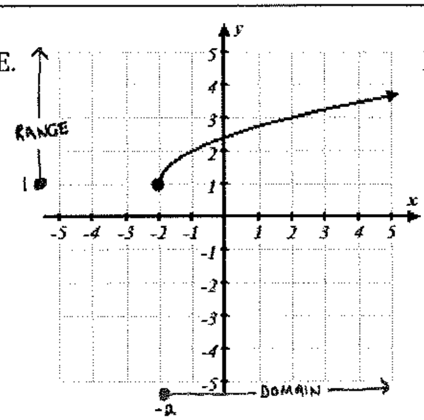
D.



LEFT & RIGHT → **Domain:** ALL REALS ($\mathbb{R}$)
$(-\infty, \infty)$

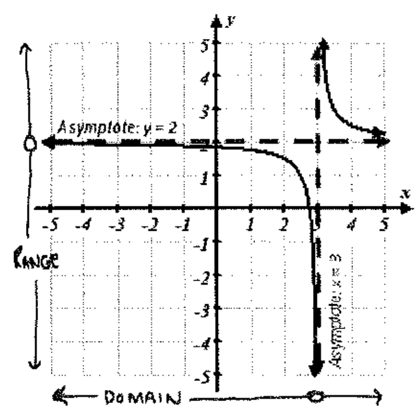
DOWN & UP → **Range:** ALL REALS ($\mathbb{R}$)
$(-\infty, \infty)$

E.



Domain: $x \geq -2$	$[-2, \infty)$
Range: $y \geq 1$	$[1, \infty)$
↑ SET NOTATION	↑ INTERVAL NOTATION

F.

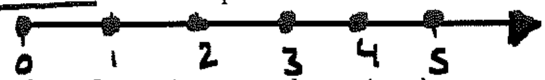


Domain: $x < 3$ OR $x > 3$ $\quad x \neq 3$
$(-\infty, 3) \cup (3, \infty)$

Range: $y < 2$ OR $y > 2$ $\quad y \neq 2$
$(-\infty, 2) \cup (2, \infty)$

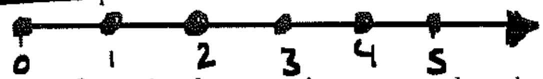
5. Determine which of the following variables are **DISCRETE** and which are **CONTINUOUS.**

a. The variable *x* represents the number of friends a person has on their Facebook account.



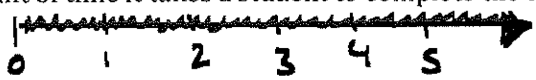
5a. circle one: **DISCRETE** **CONTINUOUS**

b. The variable *x* represents the number of questions a student missed on a test.



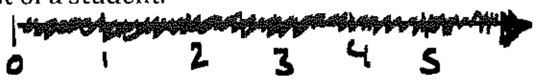
5b. circle one: **DISCRETE** **CONTINUOUS**

c. The variable *x* represents the amount of time it takes a student to complete the test.



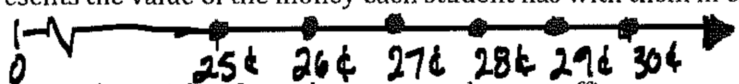
5c. circle one: **DISCRETE** **CONTINUOUS**

d. The variable *x* represents the height of a student.



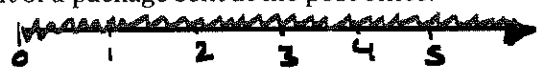
5d. circle one: **DISCRETE** **CONTINUOUS**

e. The variable *x* represents the value of the money each student has with them in class.



5e. circle one: **DISCRETE** **CONTINUOUS**

f. The variable *x* represents the weight of a package sent at the post office.

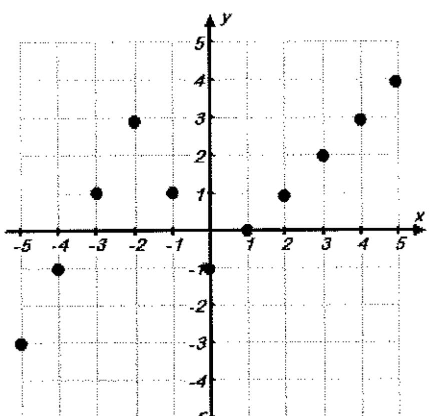


5f. circle one: **DISCRETE** **CONTINUOUS**

g. The variable *x* represents the number of packages delivered at a post office on a given day.

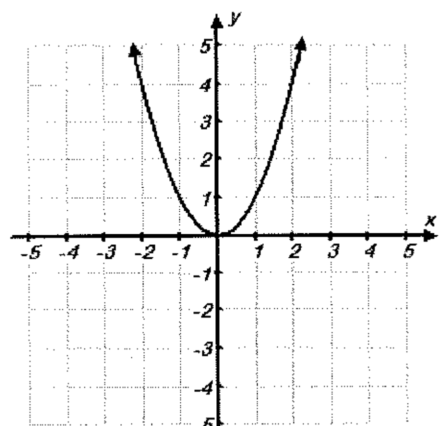
5g. circle one: **DISCRETE** **CONTINUOUS**

6. Describe the domain and range of each function below as **DISCRETE** or **CONTINUOUS**



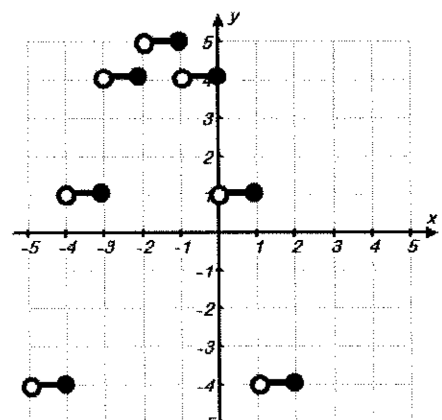
Domain: DISCRETE

Range: DISCRETE



Domain: CONTINUOUS

Range: CONTINUOUS



Domain: CONTINUOUS

Range: DISCRETE

7. Find the x and y –intercepts of the following functions.

A. $f(x) = \frac{1}{2}x + 6$

X-INT (Y=0)

$2 \cdot [0] = [\frac{1}{2}x + 6] \cdot 2$

$0 = x + 12$

$-12 \quad -12$

$-12 = x$

Y-INT (X=0)

$f(0) = \frac{1}{2}(0) + 6$

$f(0) = 0 + 6$

$f(0) = 6$

x-intercept: −12 **y-intercept:** 6

B. $g(x) = 3^x - 9$

X-INT (Y=0)

$0 = 3^x - 9$

$+9 \quad +9$

$9 = 3^x$

$x = 2$

Y-INT (X=0)

$g(0) = 3^0 - 9$

$g(0) = 1 - 9$

$g(0) = -8$

x-intercept: 2 **y-intercept:** −8

C.

x	0	2	4	6	8	10	12	14
h(x)	7	6	5	4	3	2	1	0

assume h(x) is continuous and has a domain of all real numbers

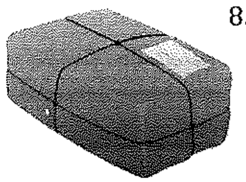
X-INT (Y=0)

(14, 0)

Y-INT (X=0)

h(0) = 7

x-intercept: 14 **y-intercept:** 7



8. A postal company delivers packages based on their weight but will not ship anything over 50 pounds. The company charges \$0.50 per pound to deliver the package anywhere in the United States. If we consider this situation a function where the number of pounds, x, is the independent variable and the cost in dollars, y, is the dependent variable determine the domain and range.

$f(x) = 0.50x$

MIN $\rightarrow f(0) = 0.50(0)$

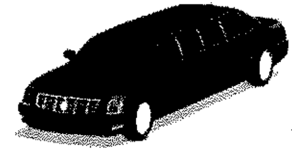
MAX $\rightarrow f(50) = 0.50(50) = 25.0$

Domain: $0 < x \leq 50$ ← CONTINUOUS

Range: $0 < y \leq 25$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.

9. A limousine company rents their limousine by the hour. The company charges \$85 per hour. The minimum time is 2 hours and a maximum of 12 hours. If we consider this situation a function where the number of hours, x, is the independent variable and the cost in dollars of renting the limousine, y, is the dependent variable determine the domain and range.



$f(x) = 85x$

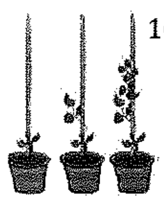
MIN $\rightarrow f(2) = 85(2) = 170$

MAX $\rightarrow f(12) = 85(12) = 1020$

Domain: $2 \leq x \leq 12$ ← CONTINUOUS

Range: $170 \leq y \leq 1020$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.



10. A student is growing a bean plant outside for a science project. The plants grow for 12 weeks before reaching their maximum height. The student consider the week she started growing the plant to be week 0 and then realized that the plant closely followed the function model $h(x) = 1.5 \cdot (1.2)^x$, where x represents the number of weeks grown and $h(x)$ represents the height of the plant in inches. Using the function model describe the appropriate domain and range.

$h(x) = 1.5\,(1.2)^x$

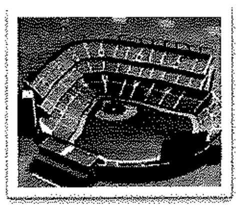
MIN $\rightarrow h(0) = 1.5\,(1.2)^0 = 1.5$

MAX $\rightarrow h(12) = 1.5\,(1.2)^{12} =$

Domain: $0 \leq x \leq 12$ ← CONTINUOUS

Range: $1.5 \leq y \leq 13.37$ ← CONTINUOUS

11. A vending company realized a relationship between the number of people present at the stadium during a Braves game and the number of hot dogs they sold. The minimum attendance due to players and support staff is 361 people and the maximum people that could be at the stadium is 86,436 people. The relationship that describes the number of hot dogs sold very closely followed the function model $h(x) = 15 \cdot \sqrt{x}$ where x represents the number of people at the stadium and $h(x)$ represents the number of hot dogs sold. What is the domain and range of the model?



$h(x) = 15 \cdot \sqrt{x}$

MIN $\rightarrow h(361) = 15 \cdot \sqrt{361} = 285$

MAX $\rightarrow h(86436) = 15\sqrt{86436} = 4410$

Domain: $361 \leq x \leq 86436$ ← DISCRETE

Range: $285 \leq y \leq 4410$ ← DISCRETE

12. An author is selling autographed copies of his book at a stand in a bookstore in the mall and charging \$12 per copy. The author brought a total of 40 books with him to sell at his stand. If the function $p(x) = 12x$ represents the gross profit the author could make during the time he is sitting at the stand, determine the appropriate domain and range.

DOMAIN (X): # OF BOOKS SOLD   RANGE (Y): MONEY MADE

$P(x) = 12x$

MIN $P(0) = 12(0) = 0$

MAX $P(40) = 12(40) = 480$

Domain: $0 \leq x \leq 40$ ← DISCRETE

Range: $0 \leq y \leq 480$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.

Coordinate Algebra I "DO"MAIN

Sec 2.10 – Functions
Domain and Range

"RANGE" Name:

1. What is the **domain** and **range** of the function described by the set of points: $\{(3,5),(2,6),(-5,3)(-7,1),(2,6)\}$

DOMAIN: $\{-7, -5, 2, 3\}$

RANGE: $\{1, 3, 5, 6\}$

2. Given $f(x) = \frac{1}{2}x + 6$ and its **domain** is described by the set $\{6,-8,4,2\}$ what is the range?

$f(6) = \frac{1}{2}(6) + 6 = 3+6 = 9$

$f(-8) = \frac{1}{2}(-8) + 6 = -4+6 = 2$

$f(4) = \frac{1}{2}(4) + 6 = 2+6 = 8$

$f(2) = \frac{1}{2}(2) + 6 = 1+6 = 7$

RANGE: $\{2, 7, 8, 9\}$

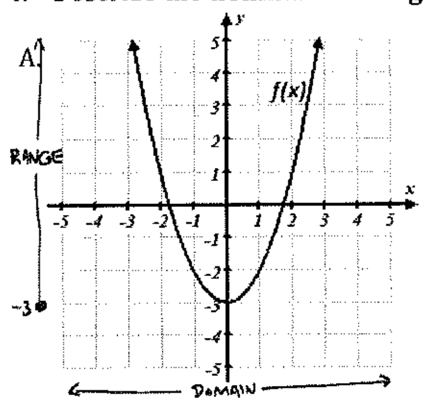
3. Given $f(x) = 2x - 1$ and its **range** is described by the set $\{5,-3,1,9\}$ what is the domain?

$2x-1=5$	$2x-1=-3$	$2x-1=1$	$2x-1=7$
$+1 \quad +1$	$+1 \quad +1$	$+1 \quad +1$	$+1 \quad +1$
$\frac{2x}{2} = \frac{6}{2}$	$\frac{2x}{2} = \frac{-2}{2}$	$\frac{2x}{2} = \frac{2}{2}$	$\frac{2x}{2} = \frac{10}{2}$
$x=3$	$x=-1$	$x=1$	$x=5$

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

4. Describe the **domain** and **range** and label the x and y – intercepts on the graphs of the following graphed functions:

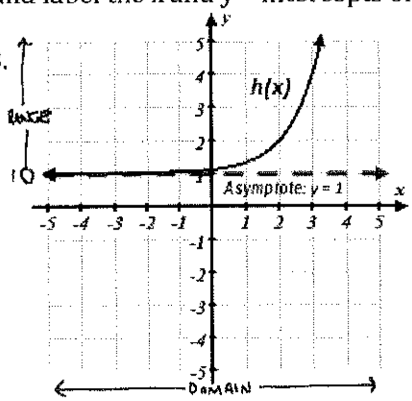
A.



LEFT & RIGHT → **Domain:** ALL REALS ($\mathbb{R}$) ← SET NOT.
$(-\infty, \infty)$ ← INTERVAL NOT.

DOWN & UP → **Range:** $y \geq -3$ ← SET NOTATION
$[-3, \infty)$ ← INTERVAL NOT.

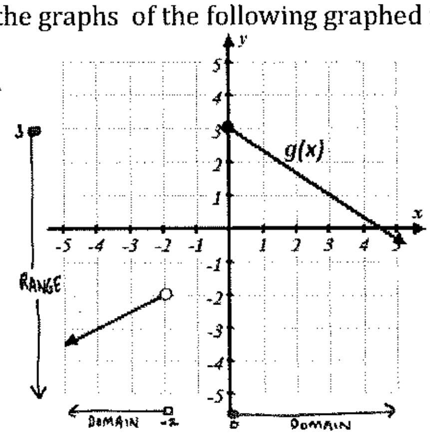
B.



Domain: ALL REALS ($\mathbb{R}$) ← SET
$(-\infty, \infty)$ ← INTERVAL

Range: $y > 1$ ← SET
$(1, \infty)$ ← INTERVAL

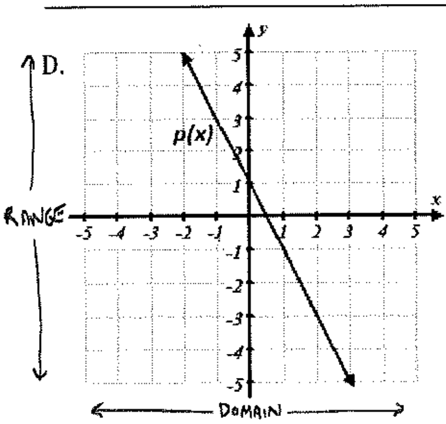
C.



Domain: $x < -2$ OR $x \geq 0$ ← SET NOTATION
$(-\infty, -2) \cup [0, \infty)$ ← INTERVAL NOT.

Range: $y \leq 3$ ← SET NOTATION
$(-\infty, 3]$ ← INTERVAL NOT.

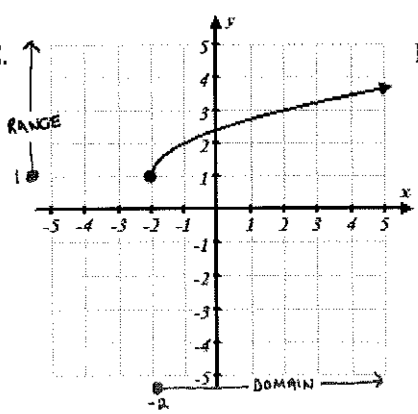
D.



LEFT & RIGHT → **Domain:** ALL REALS ($\mathbb{R}$)
$(-\infty, \infty)$

DOWN & UP → **Range:** ALL REALS ($\mathbb{R}$)
$(-\infty, \infty)$

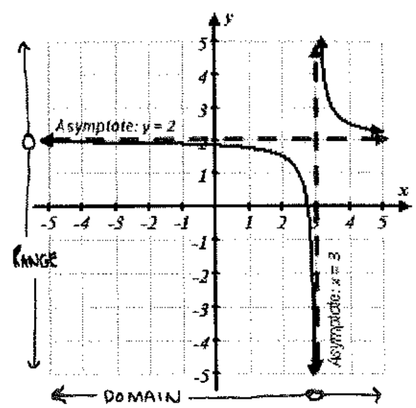
E.



Domain: $x \geq -2$	$[-2, \infty)$
Range: $y \geq 1$	$[1, \infty)$

↑ SET NOTATION ↑ INTERVAL NOTATION

F.



Domain: $X < 3$ OR $X > 3$ $\quad x \neq 3$
$(-\infty, 3) \cup (3, \infty)$

Range: $y < 2$ OR $y > 2$ $\quad y \neq 2$
$(-\infty, 2) \cup (2, \infty)$

5. Determine which of the following variables are **DISCRETE** and which are **CONTINUOUS**.

a. The variable ***x*** represents the number of friends a person has on their Facebook account.

0 1 2 3 4 5

5a. circle one: **DISCRETE** **CONTINUOUS**

b. The variable ***x*** represents the number of questions a student missed on a test.

0 1 2 3 4 5

5b. circle one: **DISCRETE** **CONTINUOUS**

c. The variable ***x*** represents the amount of time it takes a student to complete the test.

0 1 2 3 4 5

5c. circle one: **DISCRETE** **CONTINUOUS**

d. The variable ***x*** represents the height of a student.

0 1 2 3 4 5

5d. circle one: **DISCRETE** **CONTINUOUS**

e. The variable ***x*** represents the value of the money each student has with them in class.

0 25¢ 26¢ 27¢ 28¢ 29¢ 30¢

5e. circle one: **DISCRETE** **CONTINUOUS**

f. The variable ***x*** represents the weight of a package sent at the post office.

0 1 2 3 4 5

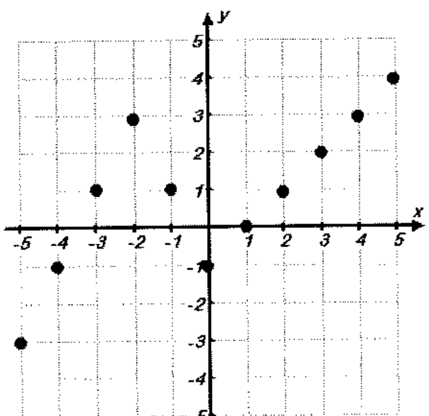
5f. circle one: **DISCRETE** **CONTINUOUS**

g. The variable ***x*** represents the number of packages delivered at a post office on a given day.

0 1 2 3 4 5

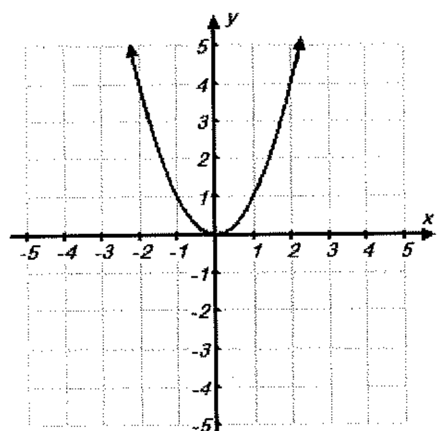
5g. circle one: **DISCRETE** **CONTINUOUS**

6. Describe the domain and range of each function below as **DISCRETE** or **CONTINUOUS**



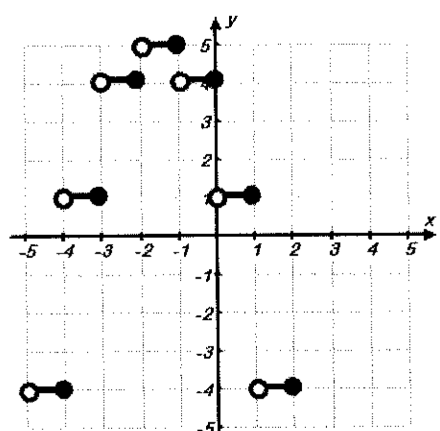
Domain: DISCRETE

Range: DISCRETE



Domain: CONTINUOUS

Range: CONTINUOUS



Domain: CONTINUOUS

Range: DISCRETE

7. Find the x and y –intercepts of the following functions.

A. $f(x) = \frac{1}{2}x + 6$

X-INT (Y=0)

$2 \cdot [0] = [\frac{1}{2}x + 6] \cdot 2$

$0 = x + 12$

$-12 \quad -12$

$-12 = x$

Y-INT (X=0)

$f(0) = \frac{1}{2}(0) + 6$

$f(0) = 0 + 6$

$f(0) = 6$

x-intercept: −12 **y-intercept:** 6

B. $g(x) = 3^x - 9$

X-INT (Y=0)

$0 = 3^x - 9$

$+9 \quad +9$

$9 = 3^x$

$x = 2$

Y-INT (X=0)

$g(0) = 3^0 - 9$

$g(0) = 1 - 9$

$g(0) = -8$

x-intercept: 2 **y-intercept:** −8

C.

x	0	2	4	6	8	10	12	14
h(x)	7	6	5	4	3	2	1	0

assume h(x) is continuous and has a domain of all real numbers

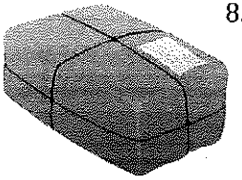
X-INT (Y=0)

(14, 0)

Y-INT (X=0)

$h(0) = 7$

x-intercept: 14 **y-intercept:** 7



8. A postal company delivers packages based on their weight but will not ship anything over 50 pounds. The company charges \$0.50 per pound to deliver the package anywhere in the United States. If we consider this situation a function where the number of pounds, x, is the independent variable and the cost in dollars, y, is the dependent variable determine the domain and range.

$f(x) = 0.50x$

MIN $\rightarrow f(0) = 0.50(0)$

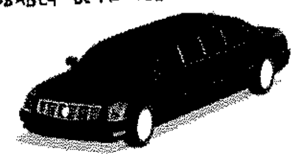
MAX $\rightarrow f(50) = 0.50(50) = 25.0$

Domain: $0 < x \leq 50$ ← CONTINUOUS

Range: $0 < y \leq 25$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.

9. A limousine company rents their limousine by the hour. The company charges \$85 per hour. The minimum time is 2 hours and a maximum of 12 hours. If we consider this situation a function where the number of hours, x, is the independent variable and the cost in dollars of renting the limousine, y, is the dependent variable determine the domain and range.



$f(x) = 85x$

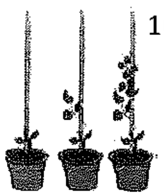
MIN $\rightarrow f(2) = 85(2) = 170$

MAX $\rightarrow f(12) = 85(12) = 1020$

Domain: $2 \leq x \leq 12$ ← CONTINUOUS

Range: $170 \leq y \leq 1020$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.



10. A student is growing a bean plant outside for a science project. The plants grow for 12 weeks before reaching their maximum height. The student consider the week she started growing the plant to be week 0 and then realized that the plant closely followed the function model $h(x) = 1.5 \cdot (1.2)^x$, where x represents the number of weeks grown and $h(x)$ represents the height of the plant in inches. Using the function model describe the appropriate domain and range.

$h(x) = 1.5\,(1.2)^x$

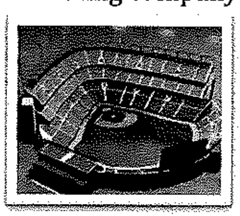
MIN $\rightarrow h(0) = 1.5\,(1.2)^0 = 1.5$

MAX $\rightarrow h(12) = 1.5\,(1.2)^{12} =$

Domain: $0 \leq x \leq 12$ ← CONTINUOUS

Range: $1.5 \leq y \leq 13.37$ ← CONTINUOUS

11. A vending company realized a relationship between the number of people present at the stadium during a Braves game and the number of hot dogs they sold. The minimum attendance due to players and support staff is 361 people and the maximum people that could be at the stadium is 86,436 people. The relationship that describes the number of hot dogs sold very closely followed the function model $h(x) = 15 \cdot \sqrt{x}$ where x represents the number of people at the stadium and $h(x)$ represents the number of hot dogs sold. What is the domain and range of the model?



$h(x) = 15 \cdot \sqrt{x}$

MIN $\rightarrow h(361) = 15 \cdot \sqrt{361} = 285$

MAX $\rightarrow h(86436) = 15\sqrt{86436} = 4410$

Domain: $361 \leq x \leq 86436$ ← DISCRETE

Range: $285 \leq y \leq 4410$ ← DISCRETE

12. An author is selling autographed copies of his book at a stand in a bookstore in the mall and charging \$12 per copy. The author brought a total of 40 books with him to sell at his stand. If the function $p(x) = 12x$ represents the gross profit the author could make during the time he is sitting at the stand, determine the appropriate domain and range.

DOMAIN (x): # OF BOOKS SOLD RANGE (y): MONEY MADE

$P(x) = 12x$

MIN $P(0) = 12(0) = 0$

MAX $P(40) = 12(40) = 480$

Domain: $0 \leq x \leq 40$ ← DISCRETE

Range: $0 \leq y \leq 480$ ← DISCRETE

* THE AMOUNT CHARGED WOULD BE DISCRETE SINCE IT WOULD PROBABLY BE ROUNDED TO THE NEAREST CENT.