Math 418

Exam 1

Sept. 22

1.

a) $2x + 5 \geq 3$

$ -5 \quad -5$

$\dfrac{2x}{2} \geq \dfrac{-2}{2}$

$\boxed{x \geq -1}$

b) $|3x - 2| \leq 14$

$3x - 2 \leq 14$ $3x - 2 \geq -14$

$ +2 \quad +2$ $ +2 \quad +2$

$\dfrac{3x}{3} \leq \dfrac{16}{3}$ $\dfrac{3x}{3} \geq \dfrac{-12}{3}$

$\boxed{x \leq 16/3}$ $-4 \leq x \leq 16/3$ $\boxed{x \geq -4}$

c) $-2|x - 1| + 4 < 2$

$ -4 \quad -4$

$\dfrac{-2|x-1|}{-2} < \dfrac{-2}{-2}$

$|x - 1| > 1$

$x - 1 > 1$ $x - 1 < -1$

$ +1 \quad +1$ $ +1 \quad +1$

$\boxed{x > 2}$ $\boxed{x < 0}$

2.

Domain of $f(x) = 3\sqrt{x+4} + \sqrt[5]{\frac{2x}{x^3+27}}$ non-zero

non-negative   non-negative

$$\boxed{Dom\ f(x) = \{x \mid x \geq -4\}}$$

$x+4 \geq 0$ $x^3 + 27 \geq 0$
$-4 \quad -4$ $-27 \quad -27$

$x \geq -4$ $\sqrt[3]{x^3} \geq \sqrt[3]{-27}$ $x^3 \geq -27$

                                                        no solution $(-3)(-3)(-3) = 27$

                                                                                        n

3.

a)

$4x + 3y = 13$
$-4x \qquad -4x$

$\frac{3y}{3} = \frac{-4x}{3} + \frac{13}{3}$

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

b)

Function $f(x)$ is linear when it is graphed, the line it produces is completely straight with no curves or breaks.

4.

a)

$$P(m) = 8m + 150$$

b)

$$P(m=300) = 8(300) + 150$$

$$P(m=300) = 2400 + 150$$

$$P(m=300) = 2550$$

$$\$ 2550$$

c) $900 = 8m + 150$
   $-150 \qquad\qquad -150$

$$\frac{750}{8} = \frac{8m}{8}$$

$$\boxed{93.79 \text{ miles}}$$

$$\begin{array}{r} 0\ 9\ 3.75 \\ 8\overline{)750.00} \\ -72\downarrow \\ \overline{30} \\ -24\downarrow \\ \overline{60} \\ -56\downarrow \\ \overline{40} \\ -40 \\ \overline{0} \end{array}$$

5. Dom $g(x) = [-3, 12]$ 　　 $p(x) = -3g(3x) + 2$
   Range $g(x) = (1, 24)$

$$\boxed{\begin{array}{l} \text{Dom } p(x) = [-1, 4] \\ \text{Range } p(x) = (-\tfrac{1}{3}, \tfrac{22}{3}) \end{array}}$$

$$\frac{-3}{3} \le \frac{3x}{3} \le \frac{12}{3}$$

$$\begin{array}{c} -1 < 3x + 2 < 4 \\ -2 \qquad -2 \quad -2 \end{array}$$

$$\frac{-1}{3} < \frac{3x}{3} < \frac{22}{3}$$

6.

$$\frac{12-6}{-8-4} = \frac{6}{-12} = -\frac{1}{2}$$

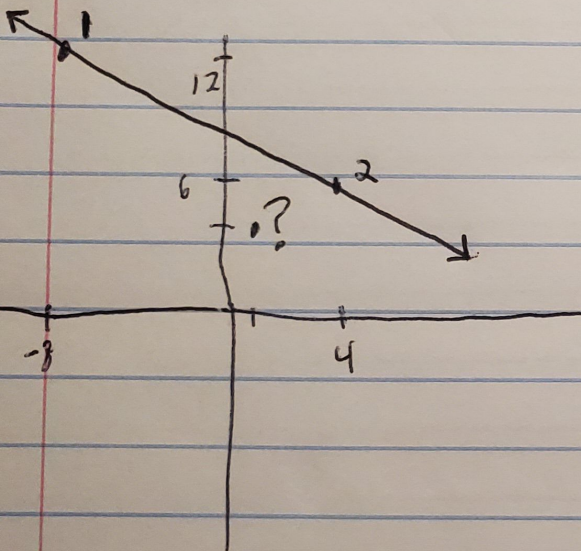$$y - 6 = -\frac{1}{2}(x - 4)$$

$$\downarrow$$

$$y = -\frac{1}{2}x + 2 + 6 \quad 8$$

$$y = -\frac{1}{2}x + 8$$

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

$$4 \neq -\frac{1}{2} + 8$$

no, the point $(1, 4)$ does not lie on the line passing through $(-8, 12)$ and $(4, 6)$.