Name _____*KEY*_____

Instructions: Show all work. Use exact answers unless specifically asked to round. Reduce as much as possible. Be sure to answer all parts of each question.

1. Solve the equation $\frac{2}{3}x + \frac{x-5}{4} = \frac{x-7}{6}$ for the variable, graphically. State whether the equation is conditional, an identity or a contradiction, and clearly state the solution (if any) or say that there is no solution. Sketch the graph you obtain from your calculator on the graph to the right and label the point of intersection if it exists.

$$\approx (.111, -1.148)$$

2. Find the equation of the line that fits the descriptions. Put your final answer in slope-intercept form.

   a. The line passing through the points (3,-4) and (4, 2).

   $$M = \frac{2-(-4)}{4-3} = \frac{6}{1} = 6$$

   $$y-2 = 6(x-4)$$
   $$y-2 = 6x-24 \implies \boxed{y = 6x-22}$$
   $$\underline{+2 \qquad +2}$$

   b. The line passing through the point (5,7) and parallel to the line $y = \frac{1}{2}x + 7$.

   $$m = \frac{1}{2}$$

   $$y-7 = \frac{1}{2}(x-5)$$
   $$y-7 = \frac{1}{2}x - \frac{5}{2} \implies \boxed{y = \frac{1}{2}x + \frac{9}{2}}$$
   $$\underline{+7 \qquad +14/2}$$

   c. The line passing through the point (-3,2) and perpendicular to the line $y = -3x - 1$.

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

   $$y-2 = \frac{1}{3}(x+3)$$
   $$y-2 = \frac{1}{3}x + 1 \implies \boxed{y = \frac{1}{3}x + 3} \qquad \frac{1}{3}(-3) = -1$$
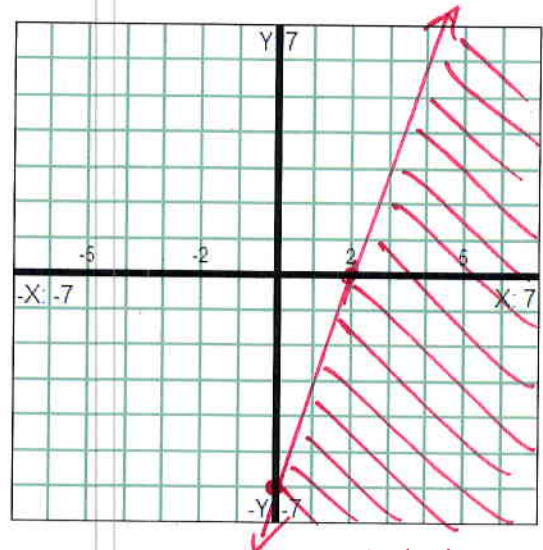 $$\underline{+2 \qquad +2}$$

d. The horizontal line passing through (1,-3).

$$y = -3$$

3. Graph the linear inequality $3x - y \geq 6$ on the graph to the right.

$x = 0 \quad -y \geq 6$
$\qquad\qquad -y = 6$
$y = 0 \qquad y = -6$
$3x = 6$
$x = 2$

Check origin $(0,0)$
is $0 \geq 6$ no
not in solution

$\dfrac{-y}{-1} \geq \dfrac{-3x + 6}{-1} \Rightarrow y \leq 3x - 6$
$\downarrow$

Solution region

4. Solve the system of equations $\begin{cases} y = 3x - 1 \\ y = -2x + 5 \end{cases}$ graphically. Sketch the graph obtained in your calculator on the graph to the right. Label the point of intersection if it exists. State whether the system is consistent or inconsistent. If it is consistent, state whether it is dependent or independent.

$(1.2, 2.6)$

Solution $(1.2, 2.6)$

Consistent
independent