No notes or calculators. Show all work.

1. (4 points) Find the equation of the line between the points $(3, 4)$ and $(6, 2)$ in <u>slope-intercept form</u>.

    Answer:
    $$\text{The slope is } m = \frac{4-2}{3-6} = -\frac{2}{3}$$

    Since we are not given the y-intercept directly, we can use point-slope form first and then rewrite the equation in slope-intercept form. (A second way is to use slope-intercept form first, plug in a point for x and y, and then solve for b.)

    $$y - y_1 = m(x - x_1)$$
    $$y - 2 = \left(-\frac{2}{3}\right)(x - 6)$$
    $$y = -\frac{2}{3}x + \left(\frac{2}{3}\right) \cdot 6 + 2$$
    $$y = -\frac{2}{3}x + 6$$

2. (4 points) Consider the supply and demand curves below. Find the equilibrium price and equilibrium quantity. <u>Be sure to clearly label each value.</u>

    $$D(q) = p = 8 - q \qquad\qquad S(q) = p = \frac{2}{5}q + 1$$

    Answer:

    Recall that the equilibrium point (and thus the eq. price and quantity) is the intersection point of the supply and demand curves.

    $$D(q) = S(q)$$
    $$8 - q = \frac{2}{5}q + 1$$
    $$7 = \frac{7}{5}q \rightarrow \quad q = 5 \quad \text{is the equilibrium quantity}$$

    Now plug in the equilibrium quantity into either $D(q)$ or $S(q)$ and solve for p

    $$D(5) = p = 8 - 5 \quad \rightarrow \quad p = 3 \quad \text{is the equilibrium price}$$

3. (2 points) The fixed cost for producing running shoes is $3060. It costs $5060 to produce 40 items. Write the cost function for producing x running shoes.

Answer:
We need to find m and b such that we have a cost function $C(x) = mx + b$. We have immediately that the fixed cost, or b, is $3060.

We are given the data point $C = 5060$ when $x = 40$. Using that point, we can solve for m.

$$C(40) = m \cdot 40 + 3060 = 5060$$
$$40m = 5060 - 3060$$
$$m = \frac{2000}{40} = 50$$

So the cost function is
$$C(x) = 50x + 3060$$