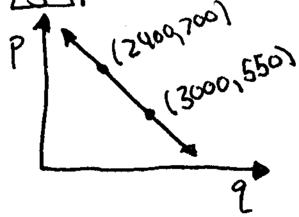
Asst. 8 Solutions
4.3 #3, 4
4.4 #3, 4, 11

4.3/ 3. a) If 6 lbs. slowed her down by 22 seconds on this course, and we assume a linear relationship Then every multiple of 6 lbs adds 22 seconds to her total time K. So the time $T(w) = K + \left(\frac{w}{6}\right)\cdot 22$

So $\boxed{T(w) = \frac{11}{3}w + K.}$

b) The rate of change of $T(w)$ is the rate at which the time increases for an additional weight. Since a small increase in w adds $\frac{11}{3}$ of that increase to $T(w)$ we can see that the rate of change of $T(w)$ is just the slope $= \boxed{\frac{11}{3}}$.

4. Figure:



a) Expressing p as a function of q: Since the graph is a line, we know $p = mq + b$, where m is the slope and b is the y intercept.
slope $= \frac{\text{rise}}{\text{run}}$, so given the 2 points on the line, $m = \frac{700-550}{2400-3000} = \frac{150}{-600} = -\frac{1}{4}$
So $p = -\frac{1}{4}q + b$. Plugging in a point: $700 = -\frac{1}{4}(2400) + b \Rightarrow b = 1300$

$\boxed{\text{So } p = -\frac{1}{4}q + 1300}$

b) We see that as q increases, p decreases. So price is inversely proportional to quantity.

4.4\ 3. a) For the supply curve, we have the points: $(0,0)$ and $(9,12)$
$y = mx + b$ $\quad m = \frac{\text{rise}}{\text{run}} = \frac{12}{9} = \frac{4}{3}$. So $y = \frac{4}{3}x + b$. Plugging in $(0,0)$
$b = 0 \Rightarrow \boxed{p = \frac{4}{3}q}$.

For the demand curve, we have points $(0,16)$ and $(12,0)$
$m = \frac{16}{-12} = \frac{-4}{3}$. $p = -\frac{4}{3}q + b$. Plug in $(0,16) \Rightarrow \boxed{p = -\frac{4}{3}q + 16}$

b) Supply and demand meet when both equations are satisfied
So $p = \frac{4}{3}q = -\frac{4}{3}q + 16 \Rightarrow \frac{8}{3}q = 16 \Rightarrow q = 6,\ p = 8$. Since these are in dollars & thousands of units, we have $\boxed{\$8 \text{ and } 6000}$ units

4. We have a cost of \$250, plus \$100 per hour. Thus

$\boxed{C(t) = 250 + 100(t)}$

11. a) Key characteristics: Should be 10 @ 8:00, 16@9:00, and the slope (= rate of change = speed) should be decreasing over the interval.

b) Since we know she slows down from 8 to 9, the most she could have run by 8:30 is $9 \frac{\text{miles}}{\text{hour}}(.5 \text{ hours}) = \boxed{4.5 \text{ miles}}$

Also, we know she runs a total of 6 miles in 1 hour, and since she is constantly slowing down, she must have run more than half that distance in the first half-hour. So a good lower bound is $\boxed{3 \text{ miles}}$.