Name: _____   **Be sure to show your work!**

1. (____/12 points) When Clyde's Discount Cycles sells Ninja motorcycles for $3,000 each, they can sell only 4. However, when they set the price at $1,500, they can sell 36 motorcycles. On the other hand Clyde's supplier will only supply 12 Ninjas at $1,250 a piece but they will supply 48 motorcycles at $2,000 each. Assume that Clyde's supply and demand functions are linear.

    (a) Find the equation of the demand function. **Remember to use p's and q's!!!**
        Using Excel :

        By Hand :

    (b) Find the equation of the supply function.
        Using Excel :

        By Hand :

    (c) Find all Market equilibria. In a sentence or two, describe how you found the equilibria or if there are none, explain how you arrived at your conclusion.

        $(q, p) =$

        EXPLANATION:

2. (____/13 points) Kenny's Overpriced Warehouse has determined that the demand function for their sofas is given by $p = -100q + 6000$. The Warehouse has also concluded that the costs associated with selling these sofas is linear. Their fixed costs being $2,500 and variables costs are $750 per sofa.

    (a) Find the revenue function. $R(q) =$

    (b) Find the cost function. $C(q) =$

    (c) Find the profit function. $P(q) =$

    (d) Find *all* break even points (if there are any), then briefly explain how you found the break even points.

        $q =$

    EXPLANATION:

3. (____/12 points) Dunder Mifflin has recorded the following profit data from their Scranton, PA office:

Reams of paper sold (in thousands)	10	25	40	100
Profit ($)	-$120,000	-$10,000	$45,000	$25,000

(a) Find the quadratic (second order polynomial) which best models their profit function.

$P(q) =$

(b) Use your model to find $MP(15) =$
EXPLAIN how you got your answer.

(c) Suppose that you know the following: $MP(67) > 0$, $MP(68) < 0$, and $MP(67.3) = 0$. What happens if the Scranton branch sells 67,300 reams of paper? Why?

(d) Suppose Dunder Mifflin's Elmira branch found that $MP(70) = -1250$ (70 represents 70,000 reams of paper sold). What does this tell us? Can we conclude from this that the Elmira branch will lose money if they sell 70,000 reams of paper?

4. (____/13 points) Let $f(x) = -3x^2 + 5x + 1$.

(a) Fill out the following table:

$h =$	1	0.01	0.0001
$\dfrac{f(1+h) - f(1)}{h} =$			

(b) Use your table to approximate $f'(1) =$

(c) Recall that $f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$. Use the limit definition of the derivative to find $f'(x)$.