Math 1030 Workshop #5 (June 15, 2009) **Name:** _____

DUE: Friday, June 18th Please turn in a paper copy and **SHOW YOUR WORK!**

1. Consider the function $P(q) = \begin{cases} -2q & q \leq 0 \\ (q-0.25)^2 e^{-0.36(q-0.25)^2} & 0 < q < 2 \\ 2q^3 - 10.6q^2 + 17.6q - 8.8 & q \geq 2 \end{cases}$

   Be careful! Wolfram Alpha has a hard time interpreting commands applied to this function. You may want to deal with the function one piece at a time.

   (a) Find all of the critical points of $P(q)$. $q =$ _____

   (b) Restricting our attention to the interval $[-2, 3]$...

   The maximum value of $P(q)$ is _____. This occurs when $q =$ _____.

   The minimum value of $P(q)$ is _____. This occurs when $q =$ _____.

2. Wendy's small business uses a moderately expensive small copier. It costs \$1,500 to purchase a new copier and she has collected the following repair cost data: The first year's repair costs were \$75 and the second year's repairs cost \$325. Model the average annual cost of the copier using a function of the form: $A(t) = \frac{C}{t} + Rt^r$ where C is the cost of purchasing a copier and Rt^r models the repair costs.

   Use the facts $Rt^r = 75$ when $t = 1$ and $Rt^r = 200 \left(= \frac{75+325}{2}\right)$ when $t = 2$ to find R and r.

   $A(t) =$ _____

   Wendy should replace the copier every _____ years and _____ months.

   If she does this, her average annual cost will be \$ _____.

3. Frank has a neighborhood grocery store. One of his most popular items is 25 lbs. bags of premium rice. In fact, he sells 1000 bags each year. Each bag costs Frank \$20. He pays \$150 every time he gets the rice delivered and his inventory costs are \$1.25 per bag per year (base inventory on average inventory with the standard assumptions).

   (a) $C(x) =$ _____

   Frank's **ideal** EOQ is _____. His **ideal** minimum annual cost is _____.

   (b) Suppose that Frank gets a discount if he places an order of 400 or more bags of rice. For orders of 400 or more, he gets the bags for \$17.50. However, his shipping costs increase to \$200 for a large shipment and he found that his inventory cost rise to \$2.50 a bag.

   $C(x) = \begin{cases} \end{cases}$

   In this case, Frank's **ideal** EOQ is _____. His **ideal** minimum annual cost is _____.

   (c) Are the solutions from parts (a) or (b) **practical solutions**? Explain.