8. A manufacturer has determined that at a price $p$, $q$ units are sold where $p = 100 - 2q$.
   The marginal revenue $\frac{dR}{dq}$

A) is POSitive for $q = 20$ and is POSitive for $q = 40$

B) is NEGative for $q = 20$ and is NEGative for $q = 40$

C) is NEGative for $q = 20$ and is POSitive for $q = 40$

D) * is POSitive for $q = 20$ and is NEGative for $q = 40$

9. (8 pts) An appliance manufacturer can sell refrigerators for $600$ apiece. The manufacturer’s total cost consists of a fixed overhead of $12,000$ plus production cost of $400$ per refrigerator. How many refrigerators must be sold for the manufacturer to break even?

* 60

10. (8 pts) At a certain factory, the total cost of manufacturing $q$ units during the daily production run is $C(q) = 0.3q^2 + 0.8q + 800$ dollars. It has been determined that approximately $t^2 + 80t$ units are manufactured during the first $t$ hours of a production run. Compute the rate at which the total manufacturing cost is changing with respect to time 2 hours after production begins.

* $\frac{dC}{dt} = \frac{dC}{dq} \cdot \frac{dq}{dt} = (0.6q + 0.8)(2t + 80)$. Evaluate at $t = 2$, $q = 164$. It is increasing at $8,332.80$/hour.
11. (20 pts) A manufacturer of self-baiting mousetraps is currently selling 1,500 traps a month to retailers at a price of $1 per trap. She estimates that for each 5 cent increase in price, she will sell 25 fewer traps per month. Her costs consist of a fixed overhead of 180 dollars a month and 30 cents per trap for labor and materials.

(i) Express the demand $q$ as a function of the price $p$.

* Since $q$ changes by −25 for every .05 change in price, the slope (rate of change) is $-25/.05$, $q = 1500 - (25/.05)(p - 1) = 2000 - 500p$

(ii) Express the price $p$ as a function of the demand $q$.

* Using (i), $p = 1 + (.05/20)(1500 - q) = (2000 - q) / 500$

(iii) Express the monthly total revenue, $\text{Revenue} = (\text{price } p) \times (\text{demand } q)$, as a function of the demand $q$.

* $\text{Revenue}(q) = q(2000 - q) / 500$

(iv) The cost of producing $q$ units per month is $180 + 0.30q$ dollars. Find the monthly dollar profit, $\text{Profit}(q)$, as a function of the demand $q$. Estimate the value of $q$ where the maximum occurs from the graph.

* $\text{Profit}(q) = \text{Revenue}(q) - \text{Cost}(q)$
  $= q(2000 - q) / 500 - (180 + 0.30q)$
  $= q(4 - .002q - 0.30) - 180$
  $= q(3.70 - .002q) - 180$

The maximum profit (5 Points extra credit) occurs at about $q = 925$ and $p = $2.15.