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

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.

* $dC/dt = dC/dq \cdot dq/dt = (0.6q + 0.8)(2t + 80)$. 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, Revenue = (price p) $\times$ (demand q), as a function of the demand q.

* 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, Profit(q), as a function of the demand q. Estimate the value of q where the maximum occurs from the graph.

*

$$\begin{aligned} \text{Profit}(q) &= \text{Revenue}(q) - \text{Cost}(q) \\ &= q(2000 - q)\,/500 - (180 + 0.30q) \\ &= q\,(4 - .002q - 0.30) - 180 \\ &= q\,(3.70 - .002q) - 180 \end{aligned}$$

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