Instructions: This homework is an individual effort. Answer each question. This is due on **Monday, March 23rd**. **Show all work to receive full credit.**

1. Find the quantity which maximizes profit when the total revenue and total cost are given by $R(q) = 5q - .003q^2$ and $C(q) = 300 + 1.1q$ for $0 \leq q \leq 1000$. Then find the quantity which minimizes profit.

2. At a price of \$80 for a half-day trip, a white-water rafting company attracts 300 customers. Every \$5 decrease in price attracts an additional 30 customers.

   a. Find the demand equation $q = D(p)$ as a function of p price.

   b. Write an equation for revenue in terms of price p.

   c. What price should the company charge per trip to maximize revenue?

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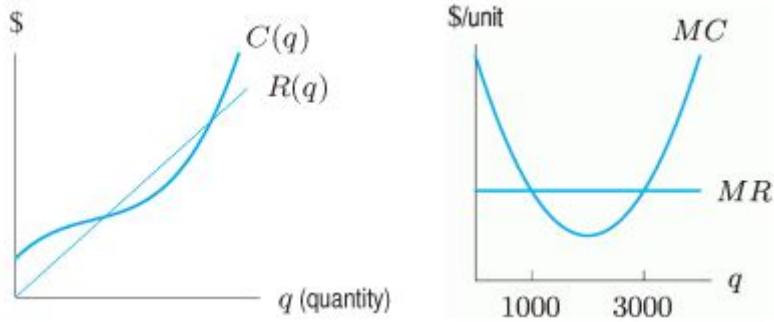
3. a. Estimate where on the first graph maximum profit is by drawing a vertical line. Explain why you think this.

   b. Using the second graph of MC and MR, explain why your thought above is true in terms of derivatives!

4. If $xy = 300$ for $x, y > 0$, find the minimum value of $x + y$.

5. Let Bob build a rectangular fence around 2000 ft^2 of land. The fence costs $30 for the first 3 sides and $10 for the last side. What is the minimum cost for Bob to build the enclosure? (Hint: Draw a picture! Come up with a cost equation and area equation!)

6. Let Bob build a farm next to a river. If Bob has 2000 ft of fencing, what is the maximum area of the enclosure? (Hint: Draw a picture! Use a perimeter equation.)