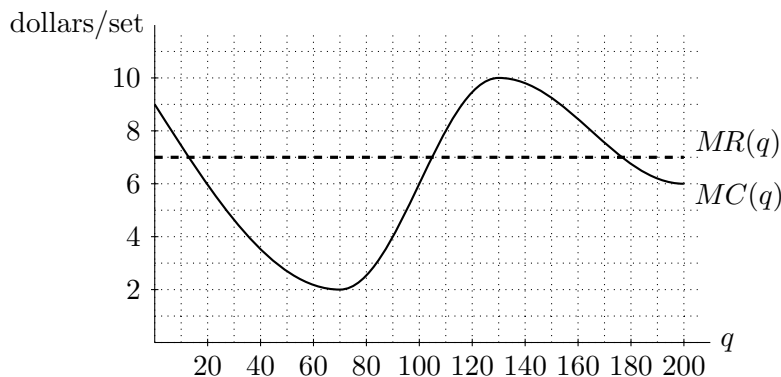


2. [12 points] Link has started a business selling winter clothes for cats. Among his most successful products are his new kitten mittens. He is currently selling his mittens for \$7 per set. Below is a graph of Link's marginal cost $MC(q)$ and marginal revenue $MR(q)$, in dollars per set of mittens, if he makes q sets of mittens this winter. Due to a shortage of yarn, Link can make a maximum of 200 sets of mittens this winter. In order to start making mittens, Link must spend \$40 on knitting supplies (in other words, it costs \$40 to make 0 sets of mittens).



You do not need to show any work for this problem.

- a. [3 points] Approximately how many sets of mittens should Link make this winter in order to maximize his profit?

Answer: Link should make about 104 sets of mittens.

- b. [2 points] If the price per set is raised to \$9, approximately how many sets of mittens should Link make in order to maximize his profit?

Answer: Link should make about 200 sets of mittens.

- c. [3 points] Write an expression involving integrals which equals Link's total profit if Link makes 150 sets of mittens. Your expression may involve the functions $MR(q)$ and $MC(q)$.

Solution:

$$\int_0^{150} (MR(q) - MC(q)) dq - 40$$

- d. [4 points] Link makes a deal with a store that would like to buy his cat hats. If the store buys up to 50 hats, then each one will cost \$10. If the store buys more than 50 hats, then Link will reduce the price of the entire order by \$0.05 per hat for every additional hat over 50. (For example, if the store buys 52 hats, they will pay \$9.90 per hat.) Write a formula for a function $L(q)$ which gives Link's revenue if he sells q hats to the store.

$$L(q) = \begin{cases} 10q & \text{if } 0 \leq q \leq 50 \\ (10 - 0.05(q - 50))q & \text{if } q > 50 \end{cases}$$