Name
SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

1. A company that manufactures $x$ bicycles per day has costs of $C(x) = 20x + 1500$ and revenue of $R(x) = -x^2 + 180x$ (both in dollars).

   a. What is the company's daily fixed cost for manufacturing bicycles? $\$1500$

   b. What is the company's daily marginal cost for manufacturing bicycles? $\$20$

   c. What is the profit function for the company?

      \[ P(x) = R(x) - C(x) \]

      \[ P(x) = -x^2 + 180x - (20x + 1500) \]

      \[ P(x) = -x^2 + 160x - 1500 \]

   d. Find the company's break-even points.

      \[ P(x) = -x^2 + 160x - 1500 = 0 \]

      \[ x^2 - 160x + 1500 = 0 \]

      \[ (x - 10)(x - 150) = 0 \]

      \[ x = 10, x = 150 \]

      The shop will break even at 10 bicycles and 150 bicycles.

   e. Find the number of bicycles that will maximize the company's daily profit.

      \[ x = \frac{-b}{2a} = \frac{-160}{2 \cdot -1} = 80 \quad \text{or} \quad x = \frac{10 + 150}{2} = 80 \]

      80 bicycles

   f. Find the number of bicycles that will maximize the company's daily revenue.

      \[ x = \frac{-b}{2a} = \frac{-180}{2 \cdot -1} = 90 \]

      90 bicycles