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?

   $$P(x) = R(x) - C(x)$$
   $$P(x) = -x^2 + 180x - (20x + 1500)$$
   $$\boxed{P(x) = -x^2 + 160x - 1500}$$

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

   $$P(x) = -x^2 + 160x - 1500 = 0$$
   $$\Rightarrow x^2 - 160x + 1500 = 0$$
   $$\Rightarrow (x - 10)(x - 150) = 0$$
   $$\Rightarrow x = 10, x = 150$$

   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