

Break-Even Analysis

A typical company must analyze its costs and the potential market for its product to determine when (or even whether) it will make a profit.

EXAMPLE: A company manufactures a 42-inch plasma HDTV that sells to retailers for \$550. The cost of making x of these TVs for a month is given by the cost function $C(x) = 250x + 213,000$.

(a) Find the function R that gives the revenue from selling x TVs.

Solution: Since revenue is the product of the price per item and the number of items, $R(x) = 550x$.

(b) What is the revenue from selling 600 TVs?

Solution: Evaluate the revenue function R at 600:

$$R(600) = 550(600) = \$330,000$$

(c) Find the profit function P . Then find the profit from selling 500 TVs.

Solution: Since Profit = Revenue – Cost, we have

$$P(x) = R(x) - C(x) = 550x - (250x + 213,000) = 550x - 250x - 213,000 = 300x - 213,000$$

therefore

$$P(500) = 300(500) - 213,000 = 150,000 - 213,000 = -63,000$$

that is, a loss of \$63,000.

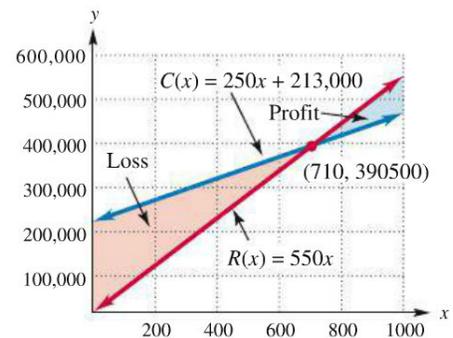
REMARK: A company can make a profit only if the revenue on a product exceeds the cost of manufacturing it.

DEFINITION: The number of units at which revenue equals cost (that is, profit is 0) is the **break-even point**.

EXAMPLE: Find the break-even point for the company in the previous Example.

Solution: The company will break even when revenue equals cost — that is, when

$$\begin{aligned} R(x) &= C(x) \\ 550x &= 250x + 213,000 \\ 300x &= 213,000 \\ x &= \frac{213,000}{300} = 710 \end{aligned}$$



The company breaks even by selling 710 TVs. The graphs of the revenue and cost functions and the break-even point (where $x = 710$) are shown in the Figure above. The company must sell more than 710 TVs ($x > 710$) in order to make a profit.