Section 4.7: Applications to Economics

These notes reflect material from our text, *Calculus, Concepts and Contexts, Third Edition*, by James Stewart, published by Brooks/Cole, Pacific Grove, CA, 2005.

Key points from Stewart, Section 4.7: Analysis of the cost, revenue and profit functions of economics.

Cost

The **cost function** is $c(x)$, where x is the number of items produced.

First thought:

$c(x)$ will be a linear function, because it costs more money to make more items.

Second thoughts:

Initial costs will arise before anything is ever made, so $c(0) > 0$.

The cost function is initially concave down because of "economies of scale."

Then the cost function becomes concave up as we outgrow the business model: "We have to open a new factory in Atlanta."

Revenue

The **revenue function** is $r(x)$, where x is the number of items produced. If $p(x)$ is the price function, then $r(x) = x * p(x)$, since the revenue is the number of items produced, x, times the price per item, $p(x)$.

First thought:

The revenue function $r(x)$ will be a linear function, because if we sell more things we make more money.

Second thoughts:

The initial revenue is 0, $r(0) = 0$.

The revenue function is initially concave up, since revenue grows slowly at first (for a local operation), but then improves as the business expands (and the business becomes better known over a wider area).

Then the revenue function becomes concave down as the market becomes saturated, and we have to lower prices to sell more items.

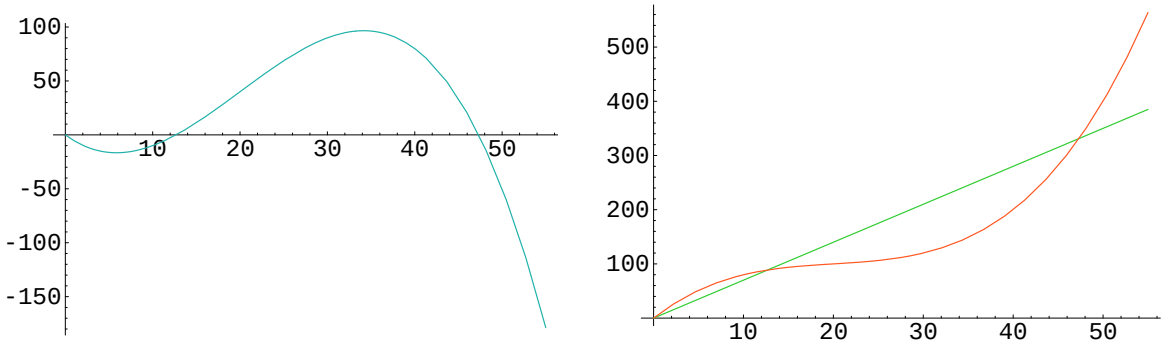

Fig. Profit = Revenue - Cost.

Exercises

Exercises for Section 4.7, pp 320–322: 1, 2, 3 (cost), 4 (revenue), 7, 9 (profit), 14 (airplane), 15 (baseball)