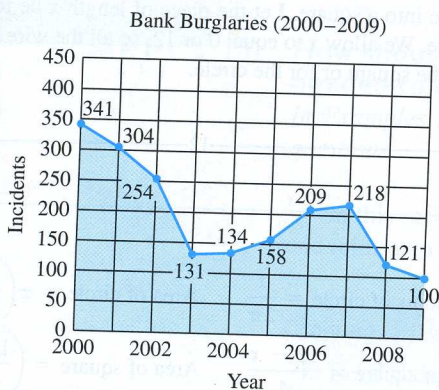


- b. Give the absolute maxima and minima and when they occur on the interval. Interpret your results.



43. **Profit** The total profit  $P(x)$  (in thousands of dollars) from the sale of  $x$  hundred thousand automobile tires is approximated by

$$P(x) = -x^3 + 9x^2 + 120x - 400, \quad x \geq 5.$$

Find the number of hundred thousands of tires that must be sold to maximize profit. Find the maximum profit.

44. **Profit** A company has found that its weekly profit from the sale of  $x$  units of an auto part is given by

$$P(x) = -0.02x^3 + 600x - 20,000.$$

Production bottlenecks limit the number of units that can be made per week to no more than 150, while a long-term contract requires that at least 50 units be made each week. Find the maximum possible weekly profit that the firm can make.

**Average Cost** Find the minimum value of the average cost for the given cost function on the given intervals.

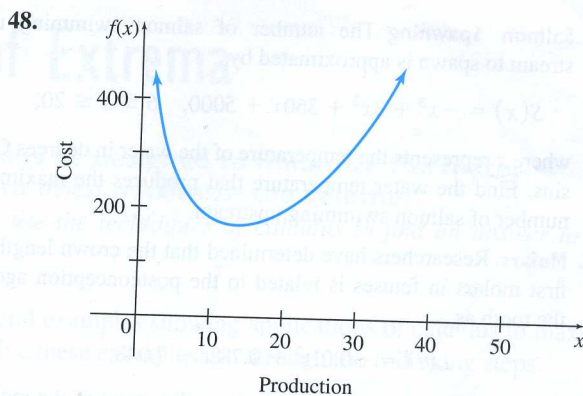
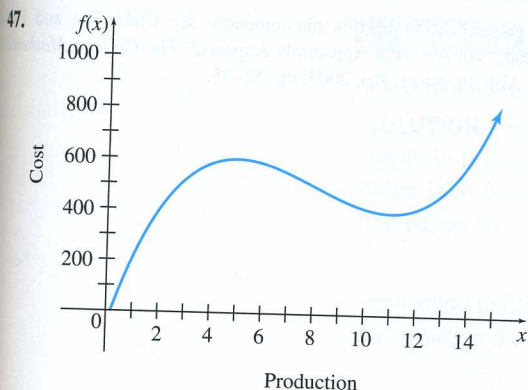
45.  $C(x) = x^3 + 37x + 250$  on the following intervals.

a.  $1 \leq x \leq 10$                       b.  $10 \leq x \leq 20$

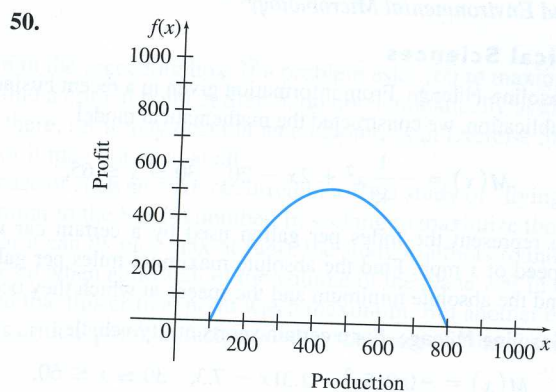
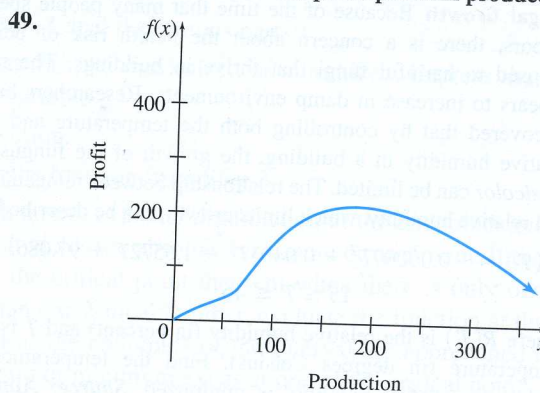
46.  $C(x) = 81x^2 + 17x + 324$  on the following intervals.

a.  $1 \leq x \leq 10$                       b.  $10 \leq x \leq 20$

**Cost** Each graph gives the cost as a function of production level. Use the method of graphical optimization to estimate the production level that results in the minimum cost per item produced.



**Profit** Each graph gives the profit as a function of production level. Use graphical optimization to estimate the production level that gives the maximum profit per item produced.



**Life Sciences**

51. **Pollution** A marshy region used for agricultural drainage has become contaminated with selenium. It has been determined that flushing the area with clean water will reduce the selenium for a while, but it will then begin to build up again. A biologist has found that the percent of selenium in the soil  $x$  months after the flushing begins is given by

$$f(x) = \frac{x^2 + 36}{2x}, \quad 1 \leq x \leq 12.$$

When will the selenium be reduced to a minimum? What is the minimum percent?