

## 4

## Review

## CONCEPT CHECK

1. Explain the difference between an absolute maximum and a local maximum. Illustrate with a sketch.

$f(x)g(x)$  where  $f(x) \rightarrow 0$  and  $g(x) \rightarrow \infty$  as  $x \rightarrow a$ ?

- (c) How can you use l'Hospital's Rule if you have a difference

EXERCISES

**44.** Investigate the family of functions  $f(x) = cxe^{-cx^2}$ . What happens to the maximum and minimum points and the inflection points as  $c$  changes? Illustrate your conclusions by graphing several members of the family.

**45.** Show that the equation  $x^{101} + x^{51} + x - 1 = 0$  has exactly one real root.

**46.** Suppose that  $f$  is continuous on  $[0, 4]$ ,  $f(0) = 1$ , and  $2 \leq f'(x) \leq 5$  for all  $x$  in  $(0, 4)$ . Show that  $9 \leq f(4) \leq 21$ .

**47.** By applying the Mean Value Theorem to the function  $f(x) = x^{1/5}$  on the interval  $[32, 33]$ , show that

$$2 < \sqrt[5]{33} < 2.0125$$

**48.** For what values of the constants  $a$  and  $b$  is  $(1, 6)$  a point of inflection of the curve  $y = ax^3 + bx^2 + cx + d$ ?

indicates that for each dollar the ticket price is lowered, average attendance will increase by 1000. How should the owners of the team set the ticket price to maximize their revenue from ticket sales?

**60.** A manufacturer determines that the cost of making  $x$  units of a commodity is

$$C(x) = 1800 + 25x - 0.2x^2 + 0.001x^3$$

and the demand function is

$$p(x) = 48.2 - 0.03x$$

- Graph the cost and revenue functions and use the graphs to estimate the production level for maximum profit.
- Use calculus to find the production level for maximum profit.

