

Directions: Work all problems in the assignment. If you need more room use the back of the page to complete the problem.

Section 2.3

Problem 10. Graph the following function on the given interval and compare the average rate of change to the instantaneous rate of change of the function at the endpoints of the interval.

$$f(x) = x^3 - 1 \quad [-1, 1]$$

Problem 14. (Chemistry: Wind Chill) At 0° Celsius the heat loss H (in kilocalories per square meter per hour) from a person's body can be modeled by

$$H = 33(10\sqrt{v} - v + 10.45)$$

where v is the wind speed (in meters per second).

- (a) Find $\frac{dH}{dv}$ and interpret its meaning.
- (b) Find the rates of change of H when $v = 2$ and $v = 5$.

Problem 18. Find the marginal cost for producing x units.

$$C = 104,000 + 7,200x$$

Problem 22. Find the marginal revenue for producing x units.

$$R = 30x - x^2$$

Problem 26. Find the marginal profit for producing x units.

$$P = -0.25x^2 + 2,000x - 1,250,000$$

Section 2.4

Problem 4. Find the derivative of the following function at the given point.

$$f(x) = \frac{1}{7}(5 - 6x^2) \quad \left(1, -\frac{1}{7}\right)$$

Problem 12. Find the derivative of the following function at the given point.

$$g(x) = \frac{x + 1}{x - 1} \quad (2, 3)$$

Problem 32. Find the derivative of the following function.

$$f(x) = (x^5 - 3x) \left(\frac{1}{x^2} \right)$$

Problem 42. Find the equation of the tangent line to the function at the given point

$$f(x) = \frac{2x + 1}{x - 1} \quad (2, 5)$$

Then use a graphing calculator or graphing utility to graph the function and the tangent line in a neighborhood of the point given.

Problem 58. **Quality Control** The percent P of defective parts produced by a new employee t days after the employee starts work can be modeled by

$$P = \frac{t + 1750}{50(t + 2)}$$

Find the rates of change of P when (a) $t = 1$, and (b) $t = 10$.

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