Business Calculus Practice Exam 2

Show all work necessary for your answers.

1. Compute the derivative of each of the following functions.

(a) $f(x) = 4\sqrt{x} - \dfrac{5}{x^3}$

(b) $y = \dfrac{5x - 4x^2}{2x^2 - 4x + 7}$

(c) $f(x) = (5x^3 - 3x + 2) \cdot e^x$

(d) $y = \left(\dfrac{7x^2 + 2x}{x + \ln(x)}\right)$

2. Suppose that the function f is given by $f(x) = 12,000 + 20x - 0.005x^2$.

(a) If x changes from $x = 100$ to $x = 103$, find the following: Δx, Δy, and dy.

(b) Estimate the change in y as x changes from $x = 100$ to $x = 103$.

(c) To compute Δy in part (a), you computed that $f(100) = 13,950$.
Given your answer to part (a), *estimate* $f(103)$.

3. The daily cost function for a firm which produces blenders is given by $C(x) = 12,000 + 20x - 0.005x^2$, where x is the number of blenders produced daily. The derivative of C is given by $C'(x) = 20 - 0.01x$.

(a) Find the average cost of increasing production from $x = 100$ to $x = 110$ blenders per day.

(b) Compute $C(100)$ and $C'(100)$.

(c) Explain the meaning of $C(100)$ and the meaning of $C'(100)$.

4. Suppose that the daily price-demand equation for a raincoat is given by $p = 30 - 0.05x$. Find the daily revenue function for the raincoats.

5. Suppose that the daily revenue equation for the production and sale of x personal speakers is given by the function $R(x) = 25x - 0.07x^2$ and the daily cost function is given by $C(x) = 9000 + 7x + 0.03x^2$. Find the daily profit function, $P(x)$.

6. Suppose that the daily revenue equation for the production and sale of x skillets is given by

$$R(x) = 28x - 0.04x^2 \qquad 0 \le x \le 700$$

(a) Compute $R(200)$ and interpret the answer you get.

(b) Compute the marginal revenue function.

(c) Compute the marginal revenue at the production level $x = 200$, and interpret the answer you get.

7. Find an equation for the line tangent to the function $f(x) = 4x - x^2 + 3$ at the point on its graph corresponding to the x value $x = 2$.

8. Suppose that the daily average cost to produce x answering machines is given by the function

$$\overline{C}(x) = \frac{5000}{x} + 12 + 0.03x \qquad 0 \le x \le 2000$$

[Note, this is already the average cost function.]

(a) Compute $\overline{C}(500)$, and interpret the answer you get..

(b) Compute $\overline{C}\,'(x)$.

(c) Compute $\overline{C}\,'(500)$, and interpret the answer you get.

9. Pat has \$1000 to invest in an account earning 2.3% interest compounded continuously. $[A = Pe^{rt}]$

(a) If Pat invests the \$1000 in this account, how much will the investment be worth in 7 years?

(b) How long must Pat invest the \$1000 in order for the money to double to \$2000?