

Math 220 - Calculus f. Business and Mgmt - Worksheet 41-42

Worksheet 41-42 - Multivariable Functions and Partial Derivatives

Exercise 1:

The cost to produce products A and B is $C(a, b) = 3000 + 5a + 6b^2$. If the current production is 10 of a and 20 of b, answer the following questions:

- 1a) What is the current cost?
- 1b) How much will cost increase by making 1 more of product A?
- 1c) How much will cost increase by making 1 more of product B?

Exercise 2:

Find and plot the domains of these functions:

$$\mathbf{2a.} \ x/y, \quad \mathbf{2b.} \ x^2\sqrt{y}, \quad \mathbf{2c.} \ (3x + 4y)/(2x - 5y), \quad \mathbf{2d.} \ \sqrt{x + y}, \quad \mathbf{2e.} \ \ln(xy - 1).$$

Exercise 3:

Find the first derivatives of the cost equation in problem 1. Evaluate the derivatives at $a = 10$ and $b = 20$. Compare your answers to the answers in parts b and c of problem 1.

Exercise 4:

Find the partial derivatives f_x and f_y of the following functions:

$$\begin{aligned} \mathbf{4a.} \ f(x, y) &= 2x^2 + 4xy^3 - 6y^2, & \mathbf{4b.} \ f(x, y) &= e^x \ln(y), & \mathbf{4c.} \ f(x, y) &= (3x^2 - 5xy)(4 \ln x), \\ \mathbf{4d.} \ f(x, y) &= (6e^y)(3xy^4 - 2x^2y^2), & \mathbf{4e.} \ f(x, y) &= \frac{3x^2y^2 - 6x^3}{5xy + 4y}, & \mathbf{4f.} \ f(x, y) &= e^{5x^2 - 3y + 7}, \\ \mathbf{4g.} \ f(x, y) &= \ln(5xy + 3x^2 - 2y^4). \end{aligned}$$

Exercise 5:

Find all four second derivatives of the following functions:

$$\mathbf{5a.} \ f(x) = 5x^7y^3, \quad \mathbf{5b.} \ f(x) = \ln(6x^2 - 2y^3).$$