

Math 2471 Calc 3 - Homework #6

Pg. 946-7, #9, 21, 22, 39 and 43

Pg. 953, #5, 11 and 19.

Pg. 946 Find all relative extrema and saddle points of the following. Use the second derivative test where applicable

$$\#9 \quad f(x, y) = x^2 + y^2 + 8x - 12y - 3$$

$$\#21 \quad f(x, y) = x^2 - xy - y^2 - 3x - y$$

$$\#22 \quad f(x, y) = 2xy - \frac{1}{2}(x^4 + y^4) + 1$$

Pg. 947 Find the absolute extrema of the following functions over the given region

$$\#39 \quad f(x, y) = x^2 - 4xy + 5, \quad D = \{(x, y) \mid 1 \leq x \leq 4, 0 \leq y \leq 2\}$$

$$\#43 \quad f(x, y) = 3x^2 + 2y^2 - 4y, \quad D = \{(x, y) \mid x^2 \leq y \leq 4\}$$

Pg. 953

#5. Find the minimum distance from the point $P(-2, -2, 0)$ to the surface $z = 1 - 2x - 2y$. (Hint: To simplify the computations, minimize the square of the distance.)

#11. A home improvement contractor is painting the walls and ceiling of a rectangular room. The volume of the room is 668.25 cubic feet. The cost of wall paint is 0.06 per square foot and the cost of ceiling paint is 0.11 per square foot. Find the room dimensions that result in a minimum cost for the paint. What is the minimum cost for the paint?

#19. A water line is to be built from point P to point S and must pass through regions where construction costs differ (see figure in the book). The cost per kilometer (in dollars) is $3k$ from P to Q , $2k$ from Q to R , and k from R to S . Find x and y such that the total cost C will be minimized.

Due: Fri. July 1, 2022.