

Math 167 Ch 8 Sample Test*(Show your work in the spaces provided on the test.)*

Name _____

I. For $f(x, y) = (3x^2 + y^2 + 1)e^{3y}$ (5 pts ea)

1. Find f_x

2. Find f_y

II. For $z = f(x, y) = x^3 - 3xy + y^3 + 2$: (15 pts ea)

1. Evaluate and plot the following on a 3D system.

2. Find the derivatives:

$f(0, 0) =$

$f_x =$

$f(1, 1) =$

$f_y =$

$f(-1, -2) =$

$f_{xx} =$

$f_{yy} =$

$f_{xy} =$

3. Find critical points and classify each point as a max, min, or saddle point.

III. On a beautiful Pacific Island four houses and a recreation center are to be built. On the coordinates of a map the front door of the houses will be located at the points: (0, 3), (2, 1), (4, 0), and (6, 4). (15 pts ea)

1. Plot the points and determine where to put the recreation center so that you minimize the total distance from the four houses.

2. A road is to be built on the island to minimize the total vertical (North-South) distance from each of the houses. Use the Least Squares Method to find the equation of the road and graph it on the coordinate system of the above problem.

III. A fenced area is to be constructed along the side of an existing building (shown below). The cost for the front fence is \$6 per foot, the outside left and right fences, \$5 per foot, and the inside divider fence, \$2 per foot. Find the dimensions to maximize the area of the region under the budget constraint of having \$720 for the project.

(15 pts)

