Calculus 3   June 27, 2016

1. Find the extreme values of $f(x, y) = x^2 + y^2 - 6y + 14$

2. Find the extreme values of $f(x, y) = y^2 - x^2$

3. Write out the second derivative test.

4. Find the local maximum and minimums values and saddle points of $f(x, y) = x^4 + y^4 - 4xy + 1$

5. Find and classify the critical points of the function

$$f(x, y) = 10x^2y - 5x^2 - 4y^2 - x^4 - 2y^4$$

6. Find the shortest distance between the point $(1, 0, -2)$ to the plane $x + 2y + z = 4$.

7. A reectangular vox without a lid is to be made from $12m^2$ of cardboard. Find the maximum volume of the box.

8. Find the absolute maximum and minimum values of the function

$$f(x, y) = x^2 - 2xy + 2y$$

on the rectangle
$$D = \{(x, y) \mid 0 \le x \le 3, 0 \le y \le 2$$