Instructions: Write complete solutions to the following problems in the space provided. Be sure to supply all the necessary steps that lead to your answers

1.   Find all local minimum and local maximum values and saddle point(s) of f

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

2.   Find all relative and absolute extrema of the given function

$$f(x) = x^2 - 2xy + 2y \text{ on the rectangle} [0,3] \times [0,2]$$

3. Find the minimum distance from the point $(0,1,1)$ to the plane $x - 2y + 3z = 6$.

4. Find the volume of the largest rectangular box in the first octant with three faces in the coordinate planes and one vertex in the plane $x + 2y + 3z = 6$.