Lecture 16 Worksheet

June 14, 2021

1. Find the maximum value of the function $f(x, y) = x + y$ on the unit disk, $D = \{(x, y) \mid x^2 + y^2 \leq 1\}$.

2. Find the maximum value of the function $f(x, y) = x^2 + y^2$ on the region $D = \{(x, y) \mid x^2 + y^2 - xy \leq 1\}$. Interpret this problem geometrically.

3. Find the minimum value of $f(x, y, z) = 3x + y + 2z$ on the paraboloid $z = (x - 1)^2 + (y - 2)^2$. Interpret this problem geometrically.

4. A large container in the shape of a rectangular prism is being designed. It needs to have a volume of 100 m^3. The material making up the bottom of the container costs \$8/m^2, while the material making up the sides of the container costs \$5/m^2. The container will not have a top. Find the dimensions of the container that minimize the cost.