

MA 213 Worksheet #15

Section 14.8

10/16/18

- 1 14.8.3 & 5 Use Lagrange multipliers to find the absolute maximum and minimum values of the function subject to the given constraint.

$$(a) f(x, y) = x^2 - y^2, \quad x^2 + y^2 = 1 \qquad (b) f(x, y) = xy, \quad 4x^2 + y^2 = 8$$

- 2 14.8.17 Find the extreme value of $f(x, y, z) = yz + xy$ subject to the constraints $xy = 1$ and $y^2 + z^2 = 1$.

- 3 14.8.29 Use Lagrange multipliers to prove that the rectangle of maximum area that has a given perimeter p is a square.

- 4 Find the absolute maximum and the absolute minimum values of $f(x, y) = xy - 4x$ in the region bounded by the x -axis and the parabola $y = 16 - x^2$.

- 5 Consider a rectangular box in the first octant with faces parallel to the coordinate planes, with one vertex at $(0, 0, 0)$ and the diagonally opposite vertex on the plane

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$$

Find the maximum volume of such a box in terms of a , b and c .