MA 213 Worksheet #13

Section 14.7(global extrema) and 14.8

1 *14.7.33* Find the absolute maximum and minimum values of $f(x, y) = x^2 + y^2 + x^2y + 4$ on the set $D = \{(x, y) \mid |x| \leq 1, |y| \leq 1\}$.

2 *14.7.53* A cardboard box without a lid is to have a volume of $32,000$ cm^3. Find the dimensions that minimize the amount of cardboard used.

3 *14.7.42* Find the point on the plane $x - 2y + 3z = 6$ that is closest to the point $(0, 1, 1)$. Note: The distance to a plane formula on page 830 in the textbook can be used to check your answer.

4 Use Lagrange multipliers to find the absolute maximum and minimum values of the function subject to the given constraint.

(a) *14.8.3* $f(x, y) = x^2 - y^2, \quad x^2 + y^2 = 1$

(b) *14.8.9* $f(x, y, z) = xy^2z, \quad x^2 + y^2 + z^2 = 4$

5 *14.8.17* Find the extreme value of $f(x, y, z) = yz + xy$ subject to the constraints $xy = 1$ and $y^2 + z^2 = 1$.

Additional Recommended Problems

6 *14.7.45* Find three positive numbers whose sum is 100 and whose product is a maximum.

7 *14.7.55* If the length of the diagonal of a rectangular box must be L, what is the largest possible volume?

8 *14.8.23* Find the extreme values of $f(x, y) = e^{-xy}$ on the region described by the inequality $x^2 + 4y^2 \leq 1$

9 *14.8.29* Use Lagrange multipliers to prove that the rectangle of maximum area that has a given perimeter p is a square.