

MATH 231: Calculus of Several Variables
Section 1, 107 Ag Sc & Ind Bldg,
TR 9:05 AM - 9:55 AM

Homework 24: Due Thursday, December 5

Please note that you will not be able to turn in revisions for this homework assignment.

1. (**Extra Credit – Worth 5 points; all or nothing**) Find the maximum and minimum values of the function $f(x, y, z) = x^4 + y^4 + z^4$ subject to $x^2 + y^2 + z^2 = 1$.
Hint: Be sure to consider the case when variables are zero. You should get a total of 26 points. Some of them will be maximums, some minimums, some in between.
2. Find the extreme value(s) of $f(x, y, z) = x^2 + y^2 + z^2$ subject to $x + y + z = 12$.
3. Find the extreme value(s) of $f(x, y, z) = yz + xy$ subject to the constraints $xy = 1$ and $y^2 + z^2 = 1$.
4. Find the absolute minimum(s) and absolute maximum(s) of $f(x, y) = 2x^2 + 3y^2 - 4x - 5$ over the domain

$$D = \{(x, y) \mid x^2 + y^2 \leq 1\}$$

Hint: Find the critical points of the function on D . Then find the extreme values of f restricted to $x^2 + y^2 = 1$, which is the boundary of D . Compare the points you find to determine which is the absolute maximum and absolute minimum. Be sure to consider the cases when the variables are zero.