

Lagrange Multipliers.

Spring 2016

Attendance Quizzes

March 1, 2016

Quiz 17 Lagrange Multipliers.

Imagine a rectangular box whose main diagonal joins the origin with a point (x, y, z) in the first octant on the surface

$G : xy + 2yz + 3zx = 18$. Answer the following.

- Let $f(x, y, z)$ be the volume of the box described above. What is the formula for the function $f(x, y, z)$? **Answer:**
 $f(x, y, z) = xyz$.
- Set up the Lagrange Multiplier equations for the problem of finding the minimum value of $f(x, y, z)$ on the surface G described above. It is not necessary to solve the equations during the quiz. You should, however do it at home.

Answer: $F = f - \lambda g = xyz - \lambda(xy + 2yz + 3zx - 18)$

Hence the equations are:

$$yz - \lambda(y + 3z) = 0, \quad xz - \lambda(2z + x) = 0, \quad xy - \lambda(2y + 3x) = 0$$

and also $xy + 2yz + 3zx - 18 = 0$. Sol.: $(x, y, z) = (2, 3, 1)$, so
volume = 6.