"QUIZ" for Lecture 11

NAME: (print!) Aditya Sivakumar **Section:** 24

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q11FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 12, 8:00pm Deadline extended to Oct. 17

1. Use Largange multipliers (no credit for other methods) to find the **smallest** value that $x+y+z$ can be, given that $xyz = 125$

$f(x,y,z) = x+y+z$ $\nabla f = \langle 1,1,1 \rangle$

$g(x,y,z) = xyz$ $\nabla g = \langle yz, xz, xy \rangle$

$x^3 = 125$

$x = 5 = y = z$

$\nabla f = \lambda \nabla g$

$\langle 1,1,1 \rangle = \lambda \langle yz, xz, xy \rangle$

$f(5,5,5) = \boxed{15}$

$\lambda yz = 1$

$\lambda xz = 1$

$\lambda xy = 1$

$x+y+z = 125$

$xyz = \lambda xyz$

$x = y$

$\lambda xz = \lambda xy$

$z = y$

$x = z = y$

2. Use Largange multipliers (no credit for other methods) to find the **largest** value that xyz can be, given that $x+y+z = 15$

$f(x,y,z) = xyz$ $\nabla f = \langle yz, xz, xy \rangle$

$g(x,y,z) = x+y+z$ $\nabla g = \langle 1,1,1 \rangle$

$3x = 15$

$x = 5 = y = z$

$\nabla f = \lambda \nabla g$

$f(5,5,5) = (5)(5)(5) = \boxed{125}$

$\langle yz, xz, xy \rangle = \lambda \langle 1,1,1 \rangle$

$\lambda = yz$

$\lambda = xz$

$\lambda = xy$

$yz = xz$ $x = y$

$xz = xy$ $z = y$

$x = y = z$