"QUIZ" for Lecture 11

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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 $xyz = 125$

$\nabla f = \langle 1,1,1 \rangle$ $\quad \lambda \nabla f = \nabla g$

$\nabla g = \langle yz, xz, xy \rangle$ $\quad \lambda\langle 1,1,1 \rangle = \langle yz, xz, xy \rangle$

$\lambda = yz \quad \lambda = xz \quad \lambda = xy$

$y = \frac{\lambda}{z} \quad z = \frac{\lambda}{x} \quad x = \frac{\lambda}{y}$

$xyz = \frac{\lambda^3}{xyz} \quad \lambda^3 = 1 \quad \lambda = 1$

$y = \frac{1}{z} \quad z = \frac{1}{x} \quad x = \frac{1}{y}$

$f(5,5,5) = 5+5+5 = 15$

$y = x \quad z = y \quad x = z$

$x = y = z \rightarrow x = y = z = 5$

$x^3 = 125$

$x = 5$

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

$\nabla f = \langle yz, xz, xy \rangle$ $\quad \nabla f = \lambda \nabla g$

$\nabla g = \langle 1,1,1 \rangle$ $\quad \langle yz, xz, xy \rangle = \lambda\langle 1,1,1 \rangle$

$yz = \lambda \quad xz = \lambda \quad xy = \lambda$

$y = \frac{\lambda}{z} \quad z = \frac{\lambda}{x} \quad x = \frac{\lambda}{y}$

$xyz = \frac{\lambda^3}{xyz}$

$1 = x^3$

$x = 1$

$y = \frac{1}{z} \quad z = \frac{1}{x} \quad x = \frac{1}{y}$

$f(5,5,5) = 125$

$x = y = z$

$3x = 15$

$x = 5$

$x = y = z = 5$