

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

$$f(-5, -5, 5) = f(-5, 5, -5) = f(5, 5, -5) = -5$$

* Not sure how to do this but used the fact
 $xyz = 125$ and made different combinations to
get 125

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

$$f(x, y, z) = x + y + z$$

$$g(x, y, z) = xyz = 125$$

$$\nabla f = \langle 1, 1, 1 \rangle$$

$$\nabla g = \langle yz, xz, xy \rangle$$

$$\nabla f = \lambda \nabla g$$

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

$$1 = \lambda yz, \quad 1 = \lambda xz, \quad 1 = \lambda xy$$

$$\lambda = \frac{1}{yz}, \quad \lambda = \frac{1}{xz}, \quad \lambda = \frac{1}{xy}$$

$$xyz \left(\frac{1}{yz} = \frac{1}{xz} = \frac{1}{xy} \right)$$

$$x = y = z = 5$$

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