

“QUIZ” for Lecture 11

NAME: (print!) Liuyang Shan

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

$$\begin{aligned} \nabla f(x, y, z) &= (1, 1, 1) \quad \nabla g(x, y, z) = (yz, xz, xy) \\ \begin{cases} \mu = yz \\ \mu = xz \\ \mu = xy \\ xyz = 125 \end{cases} &\rightarrow \mu^{\frac{3}{2}} = 125 \rightarrow \mu = 25 \rightarrow \begin{cases} x = 5 \\ y = 5 \\ z = 5 \end{cases}, \text{ so the largest value of } f(x, y, z) = 15 \end{aligned}$$

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

$$\begin{aligned} \nabla g(x, y, z) &= (1, 1, 1) \quad \nabla f(x, y, z) = (yz, xz, xy) \\ \begin{cases} \mu = yz \\ \mu = xz \\ \mu = xy \\ x + y + z = 15 \end{cases} &\rightarrow x = y = z \rightarrow \begin{cases} x = 5 \\ y = 5 \\ z = 5 \end{cases}, \text{ so the largest value of } f(x, y, z) \text{ is } 125 \end{aligned}$$