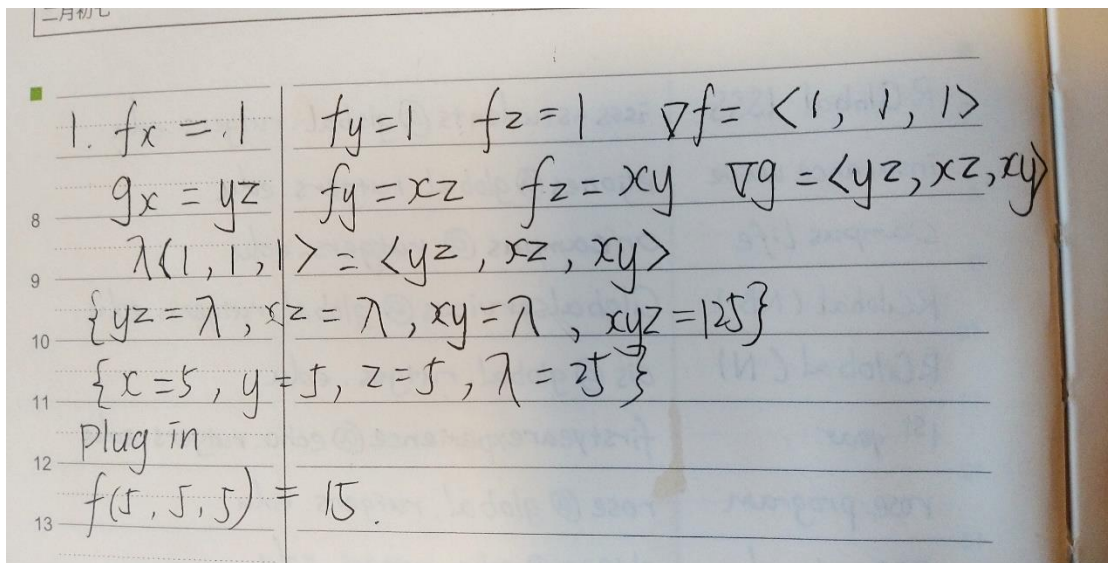


"QUIZ" for Lecture 11

NAME: (print!) Yongshan Li Section: 23

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 $xyz = 125$



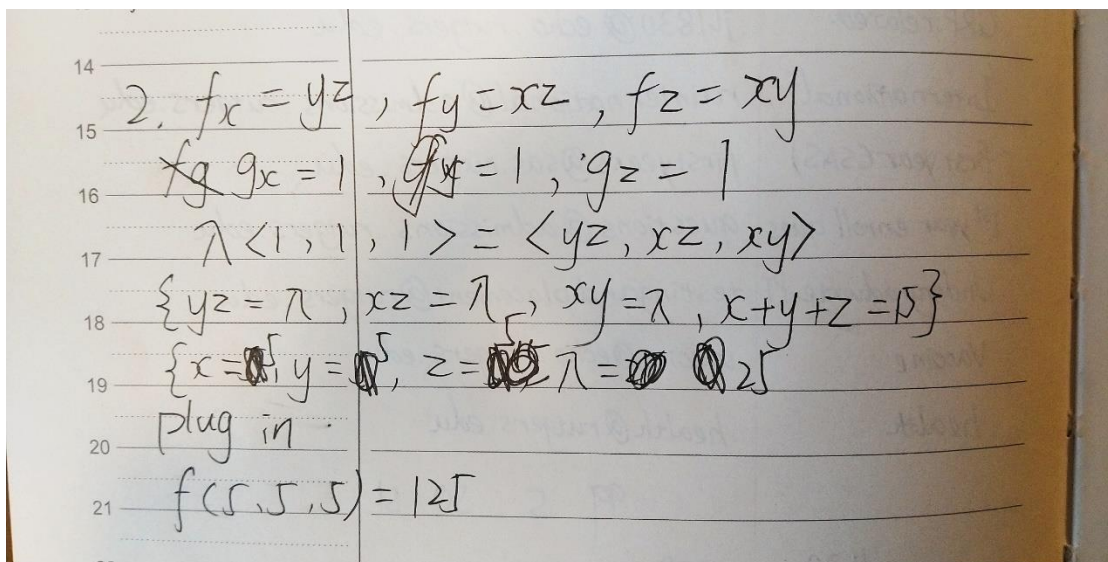
Handwritten solution for problem 1:

$$1. \quad f_x = 1 \quad f_y = 1 \quad f_z = 1 \quad \nabla f = \langle 1, 1, 1 \rangle$$
$$g_x = yz \quad g_y = xz \quad g_z = xy \quad \nabla g = \langle yz, xz, xy \rangle$$
$$\lambda \langle 1, 1, 1 \rangle = \langle yz, xz, xy \rangle$$
$$\{ yz = \lambda, xz = \lambda, xy = \lambda, xyz = 125 \}$$
$$\{ x = 5, y = 5, z = 5, \lambda = 25 \}$$

Plug in

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

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



Handwritten solution for problem 2:

$$2. \quad f_x = yz, \quad f_y = xz, \quad f_z = xy$$
$$g_x = 1, \quad g_y = 1, \quad g_z = 1$$
$$\lambda \langle 1, 1, 1 \rangle = \langle yz, xz, xy \rangle$$
$$\{ yz = \lambda, xz = \lambda, xy = \lambda, x + y + z = 15 \}$$
$$\{ x = 5, y = 5, z = 5, \lambda = 25 \}$$

plug in

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