

Q11 Rahul Paleja

$$x+y+z \quad xyz=125 \quad \text{Find smallest}$$

$$\textcircled{1} \quad \nabla f = \langle 1, 1, 1 \rangle \quad \nabla g = \langle yz, xz, xy \rangle$$

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

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

$$1 = \lambda^3 x^2 y^2 z^2$$

$$\frac{1}{yz} = \lambda$$

$$\frac{1}{xz} = \lambda$$

$$\frac{1}{xy} = \lambda$$

Use Lagrange Multipliers (no credit for other methods) to find largest

$\textcircled{2}$

$$xyz \quad x+y+z=15$$

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

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