



Quiz for Lecture 11

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Section 22

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1. $x+y+z, xyz=125$

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

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

$\nabla f = \nabla g \lambda$

$1 = \lambda yz$

$1 = \lambda xz$

$1 = \lambda xy$

$xyz=125$

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

$15625 \lambda^3 = 1$

$\lambda^3 = \frac{1}{15625}$

$\lambda = \frac{1}{25}$

$y = \frac{1}{25z} \quad x = \frac{1}{25z}$

$\frac{1}{625z} \cdot \frac{1}{z} = 1$

$z = \frac{1}{15625}$

$y = 625$

$x = 625$

$x+y+z \approx 1250$

smallest value: 1250.

2. $xy^2, x+y+z=15$

~~$\nabla f = \langle y^2, 2xy \rangle$~~

$\nabla f = \langle y^2, 2xy \rangle$

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

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

$y^2 = \lambda \rightarrow y = \frac{\lambda}{z}$

$2xz = \lambda \rightarrow x = \frac{\lambda}{2z}$

$xy = \lambda$

$x+y+z=15$

$\frac{\lambda^2}{z^2} = \lambda$

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

$z = \lambda$

$z = \sqrt{\lambda}$

$y = \frac{\sqrt{\lambda}}{\lambda} = \frac{1}{\sqrt{\lambda}}$

$x = \frac{\sqrt{\lambda}}{2\lambda} = \frac{1}{2\sqrt{\lambda}}$

$3\sqrt{\lambda} = 15$

$\sqrt{\lambda} = 5$

$\lambda = 25$

$x=y=z = \sqrt{\lambda} = \sqrt{25} = 5$

$xyz = 125$. largest: 125.