Lecture:- 15 (Review-2):

- Functions of several variables: contour plots.
- Partial derivatives $f_x = \frac{\partial f}{\partial x}$
- Gradient: $\nabla f = \langle f_x, f_y, f_z \rangle$

Approximation: $\Delta f \simeq f_x \Delta x + f_y \Delta y + f_z \Delta z$

$$\boxed{\Delta f = \nabla f \cdot \Delta \vec{r}}$$

This approximation is called tangent plane approximation, because it tells us infact, it amounts to identifying the graph of the function with its tangent plane.

It means that we assume that the function depends more or less linearly on x, y and z. And if we set these things equal, what we get is actually we are replacing the function by its linear approximation (tangent plane).

\# Tangent plane to surface $f(x,y,z) = c$ at given point can be found by looking ~~for~~ first for its normal vector

And we know that the normal vector;

→ One normal vector is given by the gradient of a function