IIT Madras

ONLINE DEGREE

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Hello everyone, so in this video we will talk about how to find the equation of the tangent plane. Suppose, so, let us do this for a 2 variable function first. So, let us consider the function $z = f(x, y)$, so this is a two variable function of two variable. And suppose we want to find the tangent of this function, tangent of the surface denoting by this function at the point $P_0 = (x_0, y_0)$.

Now, this point has to be from the domain of f, otherwise we cannot find the tangent of f, so this is in the domain of f, now we want to find the equation of the tangent at this point of this surface represented by this function. So, the tangent, equation of the tangent plane at P_0 is given as $z = f(x_0, y_0)$.

So, equation of the tangent plane is given by $f(x_0, y_0) + f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0)$.

So, let us see an example. Suppose, I am taking the same function which we have taken earlier in the first tutorial video, so this is $f(x, y) = 3x^2 + 2y^2$ and $P_0 = (1,1)$. So, this point is in the domain of the function. Now, $f_x(1,1) = 6, f_y(1,1) = 4$.

So, the equation of the tangent will be given by $f(1,1) + 6(x - 1) + 4(y-1)$. So, what we get here. So, we get $z = 6x + 4y - 5$. So, this gives us Z equal to 6x plus 4y minus 5. So, the plane is nothing but $6x + 4y - z = 5$. So, equation denotes a plane and that plane is basically the tangent plane passing through the point (1,1).

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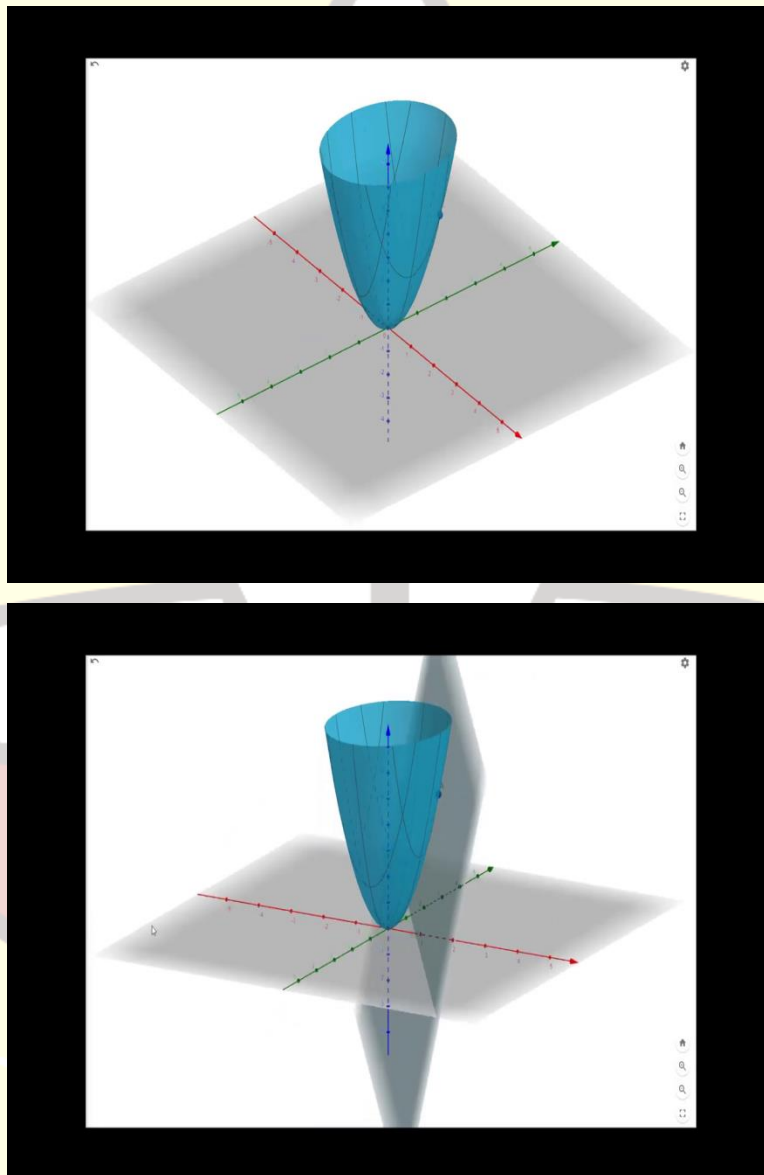
So, this is the graph of the function $f(x, y) = 3x^2 + 2y^2$ and at x=1, y=1 the functional value is 5. So, this is the point (1,1,5) in 3D plane. And if I plot the tangent plane at this point, so this will be the tangent plane at that point which is we have already calculated this to be $6x + 4y - z = 5$. So, this is the tangent plane at that point. Thank you.