

EOAS 6-6.6a

$$a) \quad \phi = x^2 + y^2 - z = 0$$

$$\nabla\phi = \left(\frac{\partial\phi}{\partial x}\right)i + \left(\frac{\partial\phi}{\partial y}\right)j + \left(\frac{\partial\phi}{\partial z}\right)k$$

$$\nabla\phi = (2x)i + (2y)j - k$$

at pt  $(3, 4, 25)$

$$\nabla\phi = 6i + 8j - k = N$$

b. Equation of plane

$$\phi = N \cdot (r - r_0) = 0$$

$$r - r_0 = (x - 3)i + (y - 4)j + (z - 25)k$$

$$\phi = N \cdot (r - r_0) = 6x - 18 + 8y - 32 - z + 25 = 0$$

$$\phi = 6x + 8y - z - 25 = 0$$

$$\phi = 6x + 8y - z = 25$$

Equation of line

$$\frac{x-3}{6} = \frac{y-4}{8} = \frac{z-25}{-1}$$