

Solutions.

Math241, Quiz 2-version a, Sept 17

Name:

Question 1: [5pt] Find a vector function that represents the curve of intersection of the two surfaces.

$$x^2 + 4y^2 = 4, \quad z = x^2y$$

Sol.) $x = 2 \cos t, \quad y = \sin t,$

$$z = 4 \cos^2 t \sin t,$$

$$\text{so } \vec{r}(t) = \langle 2 \cos t, \sin t, 4 \cos^2 t \sin t \rangle.$$

Note that the idea is

the identity. $\cos^2 \theta + \sin^2 \theta = 1$

Question 2: [5pt] Find parametric equations for the tangent line to the following curve at the given point on the curve.

$$x = e^{-t}, \quad y = (t+4)e^t, \quad z = t^{\frac{3}{2}}e^{t^2}; \quad (1, 4, 0)$$

Sol) For the tangent vector
at $(1, 4, 0)$. i.e. $t=0$.

$$x' = -e^{-t}, \quad x'(0) = -1,$$

$$y' = e^t + (t+4)e^t, \quad y'(0) = 5, \\ = (t+5)e^t,$$

$$z' = \frac{3}{2}t^{\frac{1}{2}}e^{t^2} + t^{\frac{3}{2}}e^{t^2} \cdot 2t, \quad z'(0) = 0,$$

$$\vec{v} = \langle -1, 5, 0 \rangle, \quad p = (1, 4, 0),$$

$$x = 1 - t, \quad y = 4 + 5t, \quad z = 0.$$