

Find a vector function that represents the curve of intersection of the two curves.

1.  $x + y + z = 3$  and  $z^2 + y^2 = 4$

2.  $4x^2 + 9y^2 = 1$  and  $3x + 2y + z = 5$

3. Find a unit tangent vector  $\mathbf{T}$  at  $t = \frac{\pi}{2}$ .

$$\mathbf{r}(t) = \cos t \mathbf{i} + \sin t \mathbf{j} + t \mathbf{k}$$

4. Suppose  $\mathbf{r}(t) = \langle t, \sin t \rangle$ .

a) Sketch the plane curve.

b) Compute  $\mathbf{r}'(t)$ .

c) Sketch  $\mathbf{r}(t)$  and  $\mathbf{r}'(t)$  at  $t = \frac{\pi}{2}$  and  $t = \pi$ .