

3.7-Derivatives of Vector Functions

Recall definition:

What the derivative of a vector function tells us:

Examples:

Given the position function of a particle is $\mathbf{r}(t) = (4 \cos t)\mathbf{i} + (3 \sin t)\mathbf{j}$, find the position and velocity at $t = 0$. What does this tell you about the motion of the particle? Find the speed of the particle at the point where $t = \frac{\pi}{4}$.

Find a unit tangent vector for the curve $\mathbf{r}(t) = (\sec t)\mathbf{i} + (\tan^2 t)\mathbf{j}$ at the point where $t = \frac{\pi}{3}$.

The graphs of $\mathbf{r}(t) = t^2\mathbf{i} + t^3\mathbf{j}$ and $\mathbf{r}(t) = \langle \sqrt{2} \cos t, \sqrt{2} \sin t \rangle$ intersect at the point (1,1). Find the angle of intersection to the nearest degree.

On Your Own: #3, 5, 11, 13, 17, 21