

Section 3.7, derivatives of vector functions

Exercise 1. Sketch the curves with the given vector equation

$$\vec{r}(t) = \langle t^2 + 1, 2t \rangle$$

Indicate the direction in which t increases.

Exercise 2. Find the domain and derivative of the vector function

$$\vec{r}(t) = \left\langle \sqrt{t-4}, \frac{t^2}{t^2-1} \right\rangle$$

Exercise 3. Find a tangent vector of unit length at $t = \pi/4$ of $\vec{r}(t) = \langle t \cos t, t \sin t \rangle$.

Exercise 4. The vector function

$$\vec{r}(t) = \langle 4 \cos t, 3 \sin t \rangle$$

represents the position of a particle at time t . Find the velocity and speed at the point $t = \pi/3$.

Exercise 5. At what point do the curves traced by $\vec{r}_1(t) = \langle 1-t, 3+t^2 \rangle$ and $\vec{r}_2(s) = \langle s-2, s^2 \rangle$ intersect? Find their angle of intersection correct to the nearest degree.