

Review Practice: Chapter 13

1. Let $\mathbf{r}(t) = \left\langle \frac{\sin t}{t}, e^{\cos t}, \sqrt{4-t^2} \right\rangle$

(a) Find the domain of \mathbf{r}

(b) Find $\lim_{t \rightarrow 0} \mathbf{r}(t)$

(c) Find $\mathbf{r}'(t)$

2. Find a vector function that represents the curve on intersection of

$$x^2 + y^2 + z = 4 \quad \text{and} \quad x^2 + y^2 = 9$$

3. Reparametrize $\mathbf{r}(t) = \langle e^t, \cos e^t, \sin e^t \rangle$ with respect to arc length measured from $t = 0$ in the direction of increasing t .

4. Find the curvature of the ellipse $x = 3 \cos t$, $y = 4 \sin t$ at the points $(3, 0)$ and $(0, 4)$.
5. A particle starts at the origin with initial velocity $\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and its acceleration is $\mathbf{a}(t) = \langle 6t, 12t^2, -6t \rangle$. Find its position function and its speed function.