

Math 2551 Worksheet Section 13.1

1. Given the position of a particle in the xy -plane at time t : $\vec{r}(t) = e^t \hat{i} + \frac{2}{9}e^{2t} \hat{j}$, $t = \ln 3$,
 - (a) find an equation in x and y whose graph is the path of the particle.
 - (b) find the particle's velocity and acceleration vectors at the given value of t .
 - (c) Sketch the path of the particle and include the particle's velocity and acceleration vectors at the given value of t .

2. Given the position of a particle in the xy -plane at time t : $\vec{r}(t) = (2 \cos t)\hat{i} + (3 \sin t)\hat{j} + 4t\hat{k}$, $t = \pi/2$,
- (a) find the particle's velocity and acceleration vectors.
 - (b) write the particle's velocity at the given value of t as the product of its speed and direction.

3. Find the parametric equations for the line that is tangent to the curve

$$\vec{r}(t) = \left\langle \ln t, \frac{t-1}{t+2}, t \ln t \right\rangle, \text{ at } t = 1.$$