

234 Worksheet 3  
Topics: Parametric Curves

Exercises:

1. Find a parametric equation for the line in space passing through the points (1, 2, 5) and (7, 3, 1).

2. Find a parametric equation for the line in the plane that passes through the point $P(1, 2)$ and is parallel to the vector $\vec{v} = (-1, 7)$.

3. Find a parametric equation for the circle of radius 2 that is centered at the point $(1, 2)$.

4. Let $\vec{x}(t) = \left( \frac{t}{t+1}, \frac{1}{t+1} \right)$. Find the velocity vector, unit tangent vector, and acceleration vector at time $t = -1/2$. Can you also compute the curvature vector?

5. Let $\vec{x}(t) = (\cos t + t \sin t, \sin t - t \cos t)$. Find the arc length from $t = \pi/2$ to $t = \pi$.

6. Let $f(t) = t^2 + 2t$ and $\vec{x}(t) = (\cos t, e^t)$. Define $\vec{y}(t) = f(t)\vec{x}(t)$. What is the velocity of $\vec{y}(t)$?

7. Compute the unit tangent vector, the curvature vector, the unit normal vector, and the curvature for the curve $\vec{x}(t) = (e^t \cos t, e^t \sin t, 2)$. 