

1. Find $\frac{dy}{dx}$ for the following parametric curves.

a. $x = t^3 + 3t^2 - 9t + 1$, $y = t^3$ ($-\infty < t < \infty$)

b. $x = \sqrt{t}$, $y = t - 1$ ($0 \leq t \leq 4$)

2. Find $\frac{d^2y}{dx^2}$ for $x = \sin 2t$, $y = \sin t$

3. Find the equation of the tangent line to the parametric curve
 $x = t^2 - t$, $y = t^2 + t$ at the point where $t = 2$.

4. Find the points where the tangent line of the following parametric curves is horizontal or vertical.

a. $x = t^3 + 3t^2 - 9t + 1$, $y = t^3$ ($-\infty < t < \infty$)

b. $x = \sqrt{t}$, $y = t - 1$ ($0 \leq t \leq 4$)

5. Sketch the graphs in Cartesian coordinates obtained by:

a. $r = \sin 4\theta$

b. $r = 3 + 2\sin \theta$

6. Find $\frac{dy}{dx}$ for the curves in 5 at the point $\theta = \frac{\pi}{4}$.