

Parametric Differentiation Worksheet

1. Find $\frac{dy}{dx}$ if

(a) $y(t) = t^2$ and $x(t) = \sin t$.

(b) $y(t) = \sin t$ and $x(t) = \cos t$.

(c) $y(t) = \cos t$ and $x(t) = \sin(t^2)$.

(d) $y(t) = e^t$ and $x(t) = t^2$.

(e) $y(t) = t^2$ and $x(t) = \sin t$.

2. A curve is defined by the parametric equations

$$x = t - t^2 \quad \text{and} \quad y = t + t^2.$$

Calculate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ in terms of t .

3. A curve is defined by the parametric equations

$$x = \sin t \quad \text{and} \quad y = \cos t.$$

Calculate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ in terms of t .

4. A curve is defined by the parametric equations

$$x = e^t \quad \text{and} \quad y = e^{t^2+1}.$$

Calculate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ in terms of t .