9.7) Parametric differentiation

Worked example

Find the gradient at the point P where $t = 3$, on the curve given parametrically by

$x = t^2 - t, \qquad y = t^4 - 2, \qquad t \in \mathbb{R}$

Your turn

Find the gradient at the point P where $t = 2$, on the curve given parametrically by

$x = t^3 + t, \qquad y = t^2 + 1, \qquad t \in \mathbb{R}$

$\frac{4}{13}$

Worked example

Find the equation of the tangent at the point where $t = \frac{\pi}{6}$, to the curve with parametric equations

$x = \sqrt{5}\sin 2t\,, \qquad y = 8\cos^2 t\,, \qquad 0 \leq t \leq \pi$

Your turn

Find the equation of the tangent at the point where $t = \frac{\pi}{3}$, to the curve with parametric equations

$x = \sqrt{3}\sin 2t\,, \qquad y = 4\cos^2 t\,, \qquad 0 \leq t \leq \pi$

$y = 2x - 2$

Worked example

Find the equation of the normal at the point where $\theta = \frac{\pi}{3}$, to the curve with parametric equations

$$x = 2\cos\theta\,, \qquad y = 7\sin\theta$$

Your turn

Find the equation of the normal at the point where $\theta = \frac{\pi}{6}$, to the curve with parametric equations

$$x = 3\sin\theta\,, \qquad y = 5\cos\theta$$

$$y = \frac{3\sqrt{3}}{5}x + \frac{8\sqrt{3}}{5}$$