

IMPLICIT DIFFERENTIATION

1) A circle has equation $x^2 + y^2 = 25$

Use implicit differentiation to find an equation of the normal to the circle at the point with coordinates (3,4) .

2) A circle has equation $(x - 4)^2 + (y - 3)^2 = 25$

a) Show clearly that $\frac{dy}{dx} = \frac{4-x}{y-3}$

b) Find an equation of the normal to the circle at the point (8,6) .

3) A curve has implicit equation $y^2 + 3xy - 2x^2 + 17 = 0$.

Find an equation of the tangent to the curve at the point (-2,3) .

4) The equation of a curve is given implicitly by

$$4y + y^2 e^{3x} = x^3 + C ,$$

where C is a non zero constant.

a) Find a simplified expression for $\frac{dy}{dx}$

The point $P(1,k)$, where $k > 0$, is a stationary point of the curve.

b) Find an exact value for C

5) A curve C has implicit equation $y = \frac{2x+1}{xy+3}$

a) Find an expression for $\frac{dy}{dx}$, in terms of x and y .

b) Show that there is no point on C , where the tangent is parallel to the y axis.

Answers

1) $y = \frac{4}{3}x$

2) b) $4y = 3x$

3) $x = -2$

4 a) $\frac{dy}{dx} = \frac{3(x^2 - y^2 e^{3x})}{2(2 + y e^{3x})}$

b) $C = 4e^{-\frac{3}{2}}$

5 b) $\frac{dy}{dx} = \frac{2-y^2}{2xy+3}$