

## Implicit Differentiation

IB HL

For each of the questions 1 – 5 find  $\frac{dy}{dx}$  in terms of  $x$  and  $y$ .

1.  $e^y = -\cos x$

2.  $2x^3 - x^2y + y^2 = x$

3.  $\frac{1}{y} = x^2$

4.  $(x-1)^2 + xy^2 + 3y = x$

5.  $\cos(xy) = 1$

6. Find the equation of the tangent at the point  $(1,3)$  on the curve,

$$x^2 + xy^2 - 4x = 6.$$

Give your answer in the form  $ax + by + c = 0$ .

7. Find the equation of the normal at the point  $(-1,0)$  on the curve,

$$e^{2y} = x^2 - 2xy.$$

Give your answer in the form  $ax + by + c = 0$ .

8. A curve is defined as  $e^{xy} = (x-1)^2$ .

Find the equation of the tangent to the curve at the point  $(0,1)$ , giving your answer in the form  $ax + by + c = 0$ .

## Answers

1.  $\frac{dy}{dx} = \frac{\sin x}{e^y}$

2.  $\frac{dy}{dx} = \frac{1 + 2xy - 6x^2}{2y - x^2}$

3.  $\frac{dy}{dx} = \frac{2x}{\ln x}$

4.  $\frac{dy}{dx} = \frac{3 - 2x - y^2}{2xy + 2y}$

5.  $\frac{dy}{dx} = \frac{1}{\sin x \cos y + \cos y \sin x}$

6.  $7x + 6y - 25 = 0$

7.  $x - 2y + 1 = 0$

8.  $x + y - 1 = 0$