



**Implicit Differentiation Exam Questions (From OCR 4724)**

**Q1, (Jun 2007, Q6)**

The equation of a curve is  $x^2 + 3xy + 4y^2 = 58$ . Find the equation of the normal at the point (2, 3) on the curve, giving your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers. [8]

**Q2, (Jan 2008, Q4)**

Find the equation of the normal to the curve

$$x^3 + 4x^2y + y^3 = 6$$

at the point (1, 1), giving your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers. [6]

**Q3, (Jan 2009, Q8)**

The equation of a curve is  $x^3 + y^3 = 6xy$ .

(i) Find  $\frac{dy}{dx}$  in terms of  $x$  and  $y$ . [4]

(ii) Show that the point  $(2^{\frac{4}{3}}, 2^{\frac{5}{3}})$  lies on the curve and that  $\frac{dy}{dx} = 0$  at this point. [4]

(iii) The point  $(a, a)$ , where  $a > 0$ , lies on the curve. Find the value of  $a$  and the gradient of the curve at this point. [4]

**Q4, (Jun 2009, Q8)**

(i) Given that  $14x^2 - 7xy + y^2 = 2$ , show that  $\frac{dy}{dx} = \frac{28x - 7y}{7x - 2y}$ . [4]

(ii) The points  $L$  and  $M$  on the curve  $14x^2 - 7xy + y^2 = 2$  each have  $x$ -coordinate 1. The tangents to the curve at  $L$  and  $M$  meet at  $N$ . Find the coordinates of  $N$ . [6]

**Q5, (Jun 2010, Q5)**

Find the coordinates of the two stationary points on the curve with equation

$$x^2 + 4xy + 2y^2 + 18 = 0. \quad [7]$$

**Q6, (Jan 2013, Q3)**

The equation of a curve is  $xy^2 = x^2 + 1$ . Find  $\frac{dy}{dx}$  in terms of  $x$  and  $y$ , and hence find the coordinates of the stationary points on the curve. [7]

**Q7, (Jun 2015, Q7)**

A curve has equation  $(x+y)^2 = xy^2$ . Find the gradient of the curve at the point where  $x = 1$ . [7]

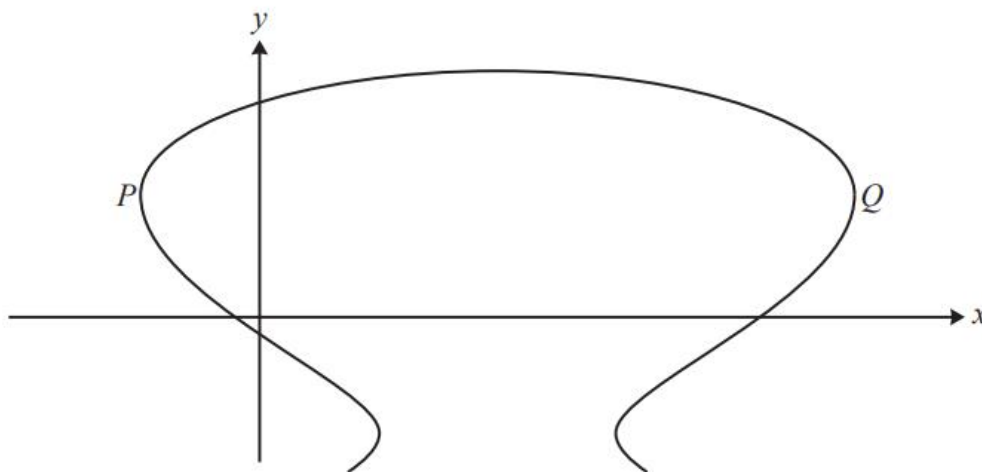


Q8, (Jun 2016, Q3)

Given that  $y \sin 2x + \frac{1}{x} + y^2 = 5$ , find an expression for  $\frac{dy}{dx}$  in terms of  $x$  and  $y$ .

[5]

Q9, (Jun 2014, Q6)



The diagram shows the curve with equation  $x^2 + y^3 - 8x - 12y = 4$ . At each of the points  $P$  and  $Q$  the tangent to the curve is parallel to the  $y$ -axis. Find the coordinates of  $P$  and  $Q$ .

[8]