Implicit Differentiation 2 - Edexcel Past Exam Questions

1. The curve C has the equation $2x + 3y^2 + 3x^2 y = 4x^2$.

The point P on the curve has coordinates $(-1, 1)$.

(a) Find the gradient of the curve at P. **(5)**

(b) Hence find the equation of the normal to C at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. **(3)**

Jan 12 Q1

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2. The curve C has equation

$$16y^3 + 9x^2y - 54x = 0.$$

(a) Find $\frac{dy}{dx}$ in terms of x and y. **(5)**

(b) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$. **(7)**

June 12 Q5

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3. A curve is described by the equation

$$x^2 + 4xy + y^2 + 27 = 0$$

(a) Find $\frac{dy}{dx}$ in terms of x and y. **(5)**

A point Q lies on the curve.

The tangent to the curve at Q is parallel to the y-axis.

Given that the x-coordinate of Q is negative,

(b) use your answer to part (a) to find the coordinates of Q. **(7)**

June 13 Q7

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4. The curve C has equation

$$3^{x-1} + xy - y^2 + 5 = 0$$

Show that $\frac{dy}{dx}$ at the point (1, 3) on the curve C can be written in the form $\frac{1}{\lambda}\ln(\mu e^3)$, where λ and μ are integers to be found. **(7)**

June 13(R) Q2

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5. A curve C has the equation

$$x^3 + 2xy - x - y^3 - 20 = 0$$

(*a*) Find $\frac{dy}{dx}$ in terms of x and y. **(5)**

(*b*) Find an equation of the tangent to C at the point (3, –2), giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. **(2)**

June 14 Q1

6.
$$x^2 + y^2 + 10x + 2y - 4xy = 10$$

(*a*) Find $\frac{dy}{dx}$ in terms of x and y, fully simplifying your answer. **(5)**

(*b*) Find the values of y for which $\frac{dy}{dx} = 0$. **(5)**

June 14(R) Q3

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7. The curve C has equation

$$x^2 - 3xy - 4y^2 + 64 = 0.$$

(*a*) Find $\frac{dy}{dx}$ in terms of x and y. **(5)**

(*b*) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$.

(*Solutions based entirely on graphical or numerical methods are not acceptable.*) **(6)**

June 15 Q2

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8. The curve C has equation

$$2x^2y + 2x + 4y - \cos(\pi y) = 17.$$

(a) Use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y. **(5)**

The point P with coordinates $\left(3, \frac{1}{2}\right)$ lies on C.

The normal to C at P meets the x-axis at the point A.

(b) Find the x coordinate of A, giving your answer in the form $\frac{a\pi + b}{c\pi + d}$, where a, b, c and d are integers to be determined. **(4)**

June 16 Q3

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9. The curve C has equation

$$4x^2 - y^3 - 4xy + 2^y = 0$$

The point P with coordinates $(-2, 4)$ lies on C.

(a) Find the exact value of $\frac{dy}{dx}$ at the point P. **(6)**

The normal to C at P meets the y-axis at the point A.

(b) Find the y coordinate of A, giving your answer in the form $p + q\ln 2$, where p and q are constants to be determined. **(3)**

June 17 Q4
