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A LEVEL MATHS

(53) Implicit Differentiation

WORKING AT D/E

(1) (a) Given that $y + 2x - 3y^2 = x^3 + 8$, show that $\frac{dy}{dx} = \frac{3x^2-2}{1-6y}$

(b) Given that $\sin y + \cos x = x - 3y$, show that $\frac{dy}{dx} = \frac{1+\sin x}{3+\cos y}$

(2) Find $\frac{dy}{dx}$ given that $\frac{y^3}{3} + \frac{1}{x} = x + 2y$ giving your answer in terms of x and y.

(3) Find $\frac{dy}{dx}$ given that $\ln y - e^{2x} - x = 4y$ giving your answer in terms of x and y.

WORKING AT B/C

(1) (a) Given that $x^2 - 2xy = y^3$, show that $\frac{dy}{dx} = \frac{2(x-y)}{(3y^2+2x)}$, $x < 0$, $y < 0$

(b) Hence, show that any stationary points on the curve satisfy the equation $y = x$

(c) Using your answer to part (b), show that there is a stationary point when $x = -1$

(2) Find $\frac{dy}{dx}$ when $\cos x - 3\sin 2y = 0.5$ giving your answer in terms of x and y

(3) (a) Find $\frac{dy}{dx}$ when $\frac{x^2}{y} + x = 6$

(b) Hence, show that the equation of the tangent to the curve with equation $\frac{x^2}{y} + x = 6$, where $x > 0$, $y > 0$ at the point (2,1) is $y = \frac{5}{4}x - \frac{3}{2}$

WORKING AT A*/A

(1) $2\cos x - \tan y = 1$, $0 \leq x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$

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

(b) Hence, find the equation of the tangent at the point $\left(\frac{\pi}{3}, \frac{\pi}{4}\right)$

(c) Find the coordinates of the stationary point on the curve.

(2) A curve has equation $xe^{4y} - 16x = y + 1$, $x > 0, y > 0$

(a) Show, that if the curve is stationary, the y coordinate of the stationary point is $\ln 2$

(b) Hence, show there are no stationary points on the curve.

(3) Find a simplified expression for $\frac{dy}{dx}$ given that $\sin(x + y) = 0$