Lesson 10

A-Level Pure Mathematics : Year 2

Differentiation IV

10.1 Mr Clever Sits An Exam

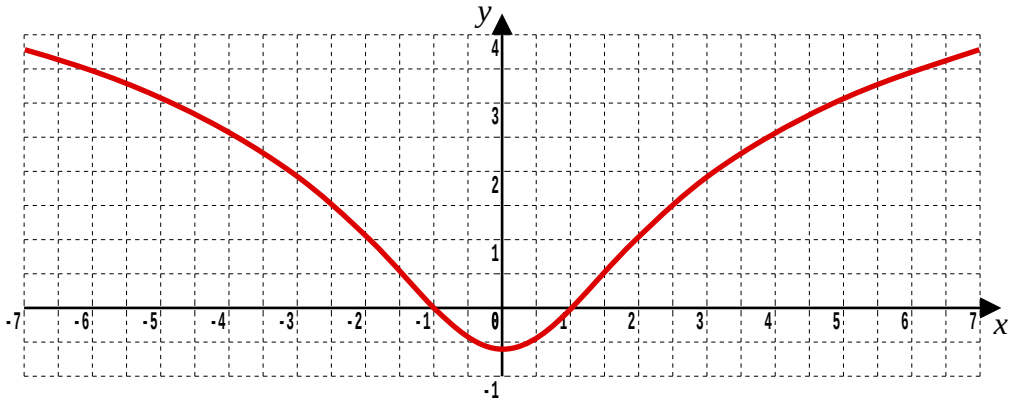
Exam questions on Implicit Differentiation often feature exponential, logarithmic or trigonometric functions. So, get some coffee in your Mr Clever cup, and give these questions a go !

10.2 Exercise

Any solution based entirely on graphical or numerical methods is not acceptable

Marks Available : 40

Question 1



The graph is of the equation $e^y + y = x^2$

Find the equation of the normal at (1, 0) in the form $y = mx + c$ and, having found it, draw the normal onto the graph.

[8 marks]

Question 2

A-Level Examination Question from June 2009, Paper C4, Q4 (Edexcel)

The curve C has the equation

$$y\,e^{-2x} = 2x + y^2$$

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

[5 marks]

The point P on C has coordinates (0, 1)

(b) 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.

[4 marks]

Question 3

A-Level Examination Question from June 2011, Paper C4, Q5 (Edexcel)

Find the gradient of the curve with equation

$$\ln y = 2x \ln x, \qquad x > 0, \qquad y > 0$$

at the point on the curve where $x = 2$

Give your answer as an exact value

[7 marks]

Question 4

A-Level Examination Question from January 2010, Paper C4, Q3 (Edexcel)

The curve C has the equation

$$\cos 2x + \cos 3y = 1, \qquad -\frac{\pi}{4} < x < \frac{\pi}{4}, \qquad 0 \leqslant y \leqslant \frac{\pi}{6}$$

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

[3 marks]

The point P lies on C where $x = \frac{\pi}{6}$

(b) Find the value of y at P

[3 marks]

(c) Find the equation of the tangent to C at P, giving your answer in the form $ax + by + c\pi = 0$, where a, b and c are integers

[3 marks]

Question 5

A-Level Examination Question from January 2007, Paper C4, Q5 (Edexcel)

A set of curves is given by the equation

$$\sin x + \cos y = 0.5$$

(a) Use implicit differentiation to find an expression for $\frac{dy}{dx}$

[2 marks]

For $-\pi < x < \pi$ and $-\pi < y < \pi$

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

[5 marks]