Lesson 6

A-Level Pure Mathematics : Year 2

Differentiation IV

6.1 Practice Makes Progression (Homework)

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

Marks Available : 26

Question 1

A-Level Specimen Exam Question from June 2000, Paper P3, Q4 edited (Edexcel)

A curve is given by parametric equations

$$x = 4\sin^3 t, \qquad y = \cos 2t, \qquad 0 \leqslant t \leqslant \frac{\pi}{4}$$

(a) Show that $\frac{dy}{dx} = -\frac{1}{3\sin t}$

[4 marks]

(b) Find an equation of the normal to the curve where $t = \frac{\pi}{6}$

[4 marks]

Question 2

A-Level Examination Question from June 2007, Paper C4, Q6 edited (Edexcel)

A curve has parametric equations

$$x = \tan^2 t, \qquad y = \sin t, \qquad 0 \leqslant t \leqslant \frac{\pi}{2}$$

(a) Show $\frac{dy}{dx} = \frac{\cos^k t}{2 \sin t}$ where k is an integer whose value is to be found

[3 marks]

(b) Find the exact gradient of the curve at the point where $t = \frac{\pi}{4}$

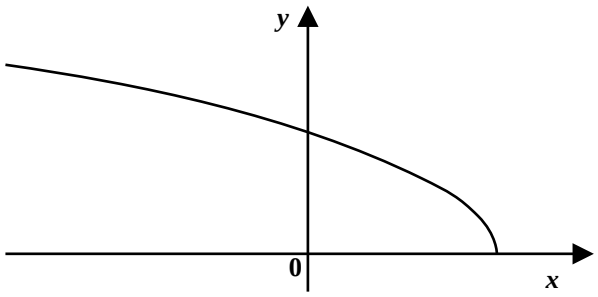
[3 marks]

(c) Find a Cartesian equation of the curve in the form $y^2 = f(x)$

[4 marks]

Question 3

A-Level Examination Question from June 2009, Paper C4, Q5 edited (Edexcel)



The graph is of the curve with parametric equations

$$x = 2\cos 2t, \qquad y = 6\sin t, \qquad 0 \leqslant t \leqslant \frac{\pi}{2}$$

(a) Find the gradient of the curve at the point where $t = \frac{\pi}{3}$

[4 marks]

(b) Find a Cartesian equation of the curve in the form

$$y = f(x), \qquad -2 \leqslant x \leqslant 2$$

[4 marks]