PARAMETRIC DIFFERENTIATION

$y = 7t^3 \qquad x = 3t^2 \qquad \frac{dy}{dx} = ?$

$\frac{dy}{dt} = 21t^2 \qquad \frac{dx}{dt} = 6t \qquad \frac{dt}{dx} = \frac{1}{6t}$

$\frac{dy}{dx} = \frac{21t^2}{6t} = \frac{7t}{2}$

$y = 3t + 2 \qquad x = 4t^2$

$\frac{dy}{dt} = 3 \qquad \frac{dx}{dt} = 8t$

$\frac{dy}{dx} = \frac{3}{8t}$

$y = \cos 2t \qquad x = 3t^3 \qquad \frac{dy}{dx} = ?$

$\frac{dy}{dt} = -2\sin 2t \qquad \frac{dx}{dt} = 9t^2$

$\frac{dy}{dx} = \frac{-2\sin 2t}{9t^2}$

2006

7 (b) The parametric equations of a curve are:

$x = 3\cos\theta - \cos^3\theta$

$y = 3\sin\theta - \sin^3\theta$, where $0 < \theta < \frac{\pi}{2}$.

(i) Find $\frac{dy}{d\theta}$ and $\frac{dx}{d\theta}$. ✓

(ii) Hence show that $\frac{dy}{dx} = \frac{-1}{\tan^3\theta}$.

$\frac{dy}{d\theta} = 3\cos\theta - 3\sin^2\theta\cos\theta \qquad \frac{dx}{d\theta} = -3\sin\theta + 3\cos^2\theta\sin\theta$

$\frac{dy}{dx} = \frac{3\cos\theta - 3\sin^2\cos\theta}{-3\sin\theta + 3\cos^2\theta\sin\theta}$ ✓

2003

7 (b) (i) The parametric equations of a curve are:

$x = \cos t + t \sin t$

$y = \sin t - t \cos t$ where $0 < t < \frac{\pi}{2}$.

Find $\frac{dy}{dx}$ and write your answer in its simplest form.

$\frac{dy}{dt} = \cos t + t\sin t - \cos t$

$\frac{dx}{dt} = -\sin t + t\cos t + \sin t$

$\frac{dy}{dx} = \frac{t\sin t}{t\cos t} = \tan t$

DERIVATIVE OF $t\cos t$

$u = t$ $\quad v = \cos t$

$\frac{du}{dt} = 1$ $\quad \frac{dv}{dt} = -\sin t$

Derivative $= -t\sin t + \cos t$

DERIVATIVE OF $t\sin t$? PRODUCT

$u = t$ $\quad v = \sin t$

$\frac{du}{dt} = 1$ $\quad \frac{dv}{dt} = \cos t$

Derivative $= t\cos t + \sin t$

B3 →

C2 →

C3 →

D1 →

A1 – 100

A2 – 90

B1 – 85

– 80

B2

B3 – 75

C1 – 70 ← 97·5

C2 – 65

A1 C3 – 60

D1 – 55

A2 D2 – 50

B1 D3 > 45