

P101 Coursework 2

Name:

Fill in the final answer in the boxes on this sheet. Make sure that you attach this page, containing your **name**, as well as your final answers, to your **worked answers**. Staple all pages together and do not use red ink. Please return this assessment before Tuesday 12 November 2001, 10 am, in the departmental office, room H15.

6. Use parametric differentiation to evaluate dy/dx given that

$$x = a \cos \theta - \theta, \quad y = a \sin \theta + \theta.$$

$\frac{dy}{dx}$:

1. Given $A = (2, 0, 2)$, $B = (0, 3, 3)$, and $C = (1, 1, 0)$

(i) Find the vector \vec{AB} /3

(ii) Find the position vector of the midpoint of AB /4

(iii) Find $\vec{AB} \cdot \vec{BC}$ /3

2. Given the vectors $\mathbf{a} = (2, 0, 2)$, $\mathbf{b} = (0, 3, 3)$, and $\mathbf{c} = (1, 1, 0)$

(i) find the angle between \mathbf{a} and \mathbf{b} /3

(ii) calculate $\mathbf{a} \times \mathbf{b}$ /4

(iii) calculate $(\mathbf{a} \times \mathbf{b}) \times \mathbf{a}$ /3

3. Differentiate

(i) $\tan x/x$ /5

(ii) e^{x^2+1} /5

(iii) $x \ln x - x^2$ /5

(iv) $\tan^{-1}(x/10)$ /5

4. Find dy/dx when $x^2y^2 + 3xe^y + y^2 \sin 2x = 6$.

$\frac{dy}{dx}$: /10

5. Use logarithmic differentiation to find dy/dx for $y = \frac{\sqrt{1+x^2}(1+2x)}{(1-x)^3}$.

$\frac{dy}{dx}$: /10