Differentiation 2

Name:

1 Find $\int (2x^{-4} + \cos 5x)\,dx$.

A $-\frac{2}{5}x^{-5} - 5\sin 5x + c$

B $-\frac{2}{5}x^{-5} + \frac{1}{5}\sin 5x + c$

C $-\frac{2}{3}x^{-3} + \frac{1}{5}\sin 5x + c$

D $-\frac{2}{3}x^{-3} - 5\sin 5x + c$ 2

2 Given that $f(x) = (4 - 3x^2)^{-\frac{1}{2}}$ on a suitable domain, find $f'(x)$.

A $-3x(4 - 3x^2)^{-\frac{1}{2}}$

B $-\frac{1}{2}(4 - 6x)^{-\frac{3}{2}}$

C $2(4 - 3x^3)^{\frac{1}{2}}$

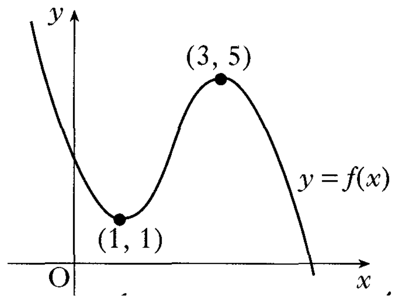
D $3x(4 - 3x^2)^{-\frac{3}{2}}$ 2

3 Given that $y = \sqrt{3x^2 + 2}$, find $\frac{dy}{dx}$. 3

4 If $y = \frac{1}{x^3} - \cos 2x$, $x \neq 0$, find $\frac{dy}{dx}$. 4

5 The graph of the cubic function $y = f(x)$ is shown in the diagram. There are turning points at (1, 1) and (3, 5).

Sketch the graph of $y = f'(x)$. 3



6 The point P(x, y) lies on the curve with equation $y = 6x^2 - x^3$.

(*a*) Find the value of x for which the gradient of the tangent at P is 12. 5

(*b*) Hence find the equation of the tangent at P. 2

7 In the diagram, Q lies on the line joining (0, 6) and (3, 0).

OPQR is a rectangle, where P and R lie on the axes and OR = t.

(*a*) Show that QR = $6 - 2t$. 3

(*b*) Find the coordinates of Q for which the rectangle has a maximum area. 6