Higher Maths **Differentiation 1** NAME:

For each of the multiple choice questions show your working at the side to justify your answer.

1 If $s(t) = t^2 - 5t + 8$, what is the rate of change of s with respect to t when $t = 3$?

A -5

B 1

C 2

D 9

2

2 If $f(x) = \frac{1}{\sqrt[5]{x}}$, $x \neq 0$, what is $f'(x)$?

A $-\frac{1}{5}x^{-\frac{6}{5}}$

B $-\frac{1}{5}x^{-\frac{4}{5}}$

C $-\frac{5}{2}x^{-\frac{7}{2}}$

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

2

3 A curve has equation $y = 5x^3 - 12x$.

What is the gradient of the tangent at the point $(1, -7)$?

A -7

B -5

C 3

D 5

2

4 What is the derivative of $\frac{1}{4x^3}$, $x \neq 0$?

A $\frac{1}{12x^2}$

B $-\frac{1}{12x^2}$

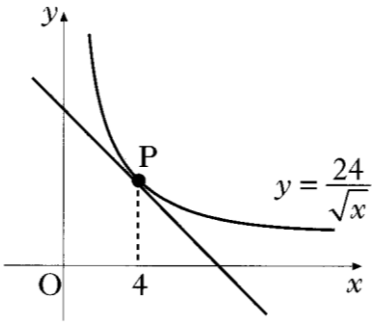
C $\frac{4}{x^4}$

D $-\frac{3}{4x^4}$

2

5 The diagram shows the graph of $y = \frac{24}{\sqrt{x}}$, $x > 0$.

Find the equation of the tangent at P, where $x = 4$. 6



6 A function f is defined by the formula $f(x) = 3x - x^3$.

(a) Find the exact values where the graph of $y = f(x)$ meets the x- and y-axes. 2

(b) Find the coordinates of the stationary points of the function and determine their nature. 7

(c) Sketch the graph of $y = f(x)$. 1