

Reading Time: An initial 2 minutes to view BOTH sections



MATHEMATICS METHODS : UNITS 3 & 4, 2023

RG

Test 1 – Differentiation Rules and Applications (10%) 3.1.7, 3.1.8, 3.1.10 – 3.1.16, 3.2.1 – 3.2.3

Time Allowed 30 minutes	First Name	Surname	Marks 27 marks
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Circle your Teacher's Name: Mrs Alvaro Ms Chua Mrs Fraser-Jones
Mrs Greenaway Mr Luzuk Mrs Murray
Ms Narendranathan Mr Tanday

Assessment Conditions: (N.B. Sufficient working out must be shown to gain full marks)

- ❖ Calculators: Not Allowed
- ❖ Formula Sheet: Provided
- ❖ Notes: Not Allowed

PART A – CALCULATOR FREE

QUESTION 1

(4 marks)

Find the derivative of $y = (3x^2 - 2x)^3$, clearly demonstrating the use of the chain rule.
DO NOT SIMPLIFY.

QUESTION 2

(2, 2 – 4 marks)

Find the derivative of the following with respect to x (DO NOT SIMPLIFY):

a) $y = x^3(3x - 5)^4$

b) $f(x) = \pi^2 + \sqrt{x^2 - 3x}$

QUESTION 3**(3 marks)**

Find the gradient of the curve with the equation $y = \frac{2x^2 - 1}{x^2 + 2}$ where $x = 2$.

QUESTION 4**(1, 3 – 4 marks)**

For $y = \frac{3x^2 + 8}{2x}$:

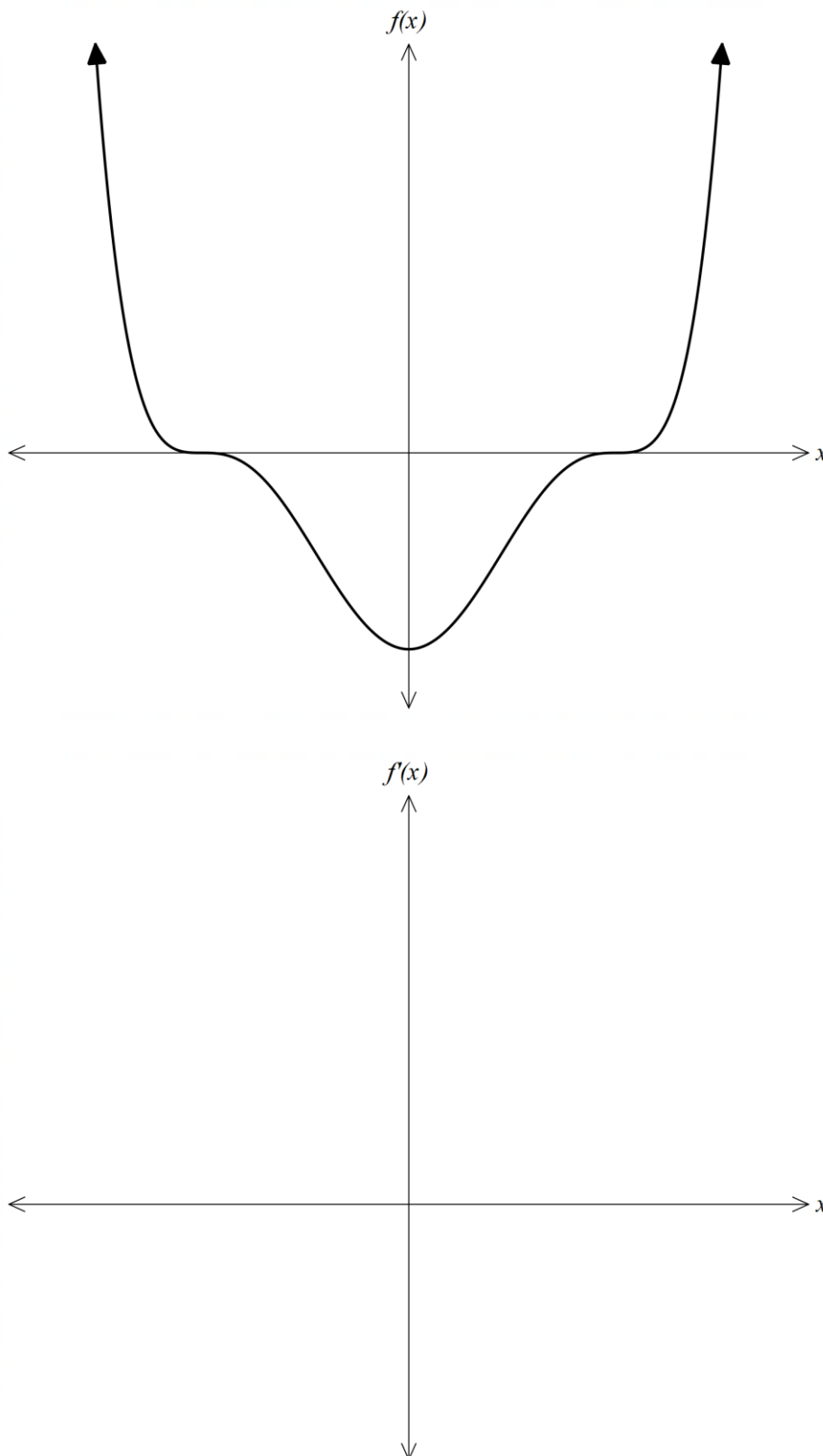
a) Find $\frac{dy}{dx}$ (DO NOT SIMPLIFY)

b) State the approximate increase in y (in terms of p) as x increases from 2 to $2 + p$ when p is small.

QUESTION 5

(3 marks)

The graph of $y = f(x)$ is as shown below. On the axes provided, sketch the graph of $y = f'(x)$



QUESTION 6**(4 marks)**

A variable z is defined as the sum of the squares of two other variables x and y . That is, $z = x^2 + y^2$. Furthermore $x + y = 4$. Find the values of x and y such that z takes its minimum value.

QUESTION 7**(1, 2, 2 – 5 marks)**

Find the following:

a) $\int x^2 - 3x + 2 dx$

b) $\int x - x^{\frac{1}{2}} dx$

c) $\int x^{2a+2} dx$