

3.5 Selecting Procedures for Calculating Derivatives

Name: _____ Class: _____ Date: _____ Total: 9 marks

KEY WORDS chain rule 链式法则

Objective

Build the skills to answer exam questions on **selecting procedures for calculating derivatives**.

You must be able to:

- recognise the structure of an expression and pick the right rule (power, product, quotient, chain)

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Choosing a rule

- a power of $x \rightarrow$ **power rule**;
- a product $\rightarrow$ **product rule**;
- a quotient $\rightarrow$ **quotient rule**;
- a composite (function of a function) $\rightarrow$ **chain rule**.

Combine them when an expression mixes structures.

2 Practice

2.1 State which rule to use for a composite. [1]

2.2 State which rule to use for a product. [1]

2.3 For $y = x^2 \sin x$, name the rule. [2]

3 Exam-style questions

3.1 For $y = (x^2 + 1)^5$, use the [1]

- A quotient rule
- B chain rule
- C product rule only
- D no rule

3.2 For $y = \frac{x}{x+1}$, use the [1]

- A power rule
- B quotient rule
- C chain rule
- D sum rule

3.3 Name the rule for each.

(a) $y = x^3$. [1]

(b) $y = x e^x$. [1]

(c) $y = \sin(x^2)$. [1]

Solutions

2.1 the chain rule.

2.2 the product rule.

2.3 the product rule.

3.1 B.

3.2 B.

3.3 (a) power rule. (b) product rule. (c) chain rule.