AP CALCULUS AB • EXERCISE SHEET

5.8 Sketching a Function and Its Derivatives

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

Objective

Build the skills to answer exam questions on **sketching functions and their derivatives**.

You must be able to:

- relate features of f to the sign and zeros of f'

1 Worked examples

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

■ **Sketching f and f'**

- where f has a local max/min, $f' = 0$ (crosses the axis);
- where f is increasing, $f' > 0$ (above the axis);
- where f is concave up, f' is increasing.

Use these links to sketch one graph from the other.

2 Practice

2.1 State the value of f' at a local extremum of f. [1]

2.2 State the sign of f' where f is increasing. [1]

2.3 State what f' does where f is concave up. [2]

3 Exam-style questions

3.1 At a local max of f, f' is [1]

- **A** positive
- **B** zero
- **C** negative always
- **D** undefined

3.2 Where f is decreasing, its derivative f' is [1]

- **A** positive
- **B** negative
- **C** zero
- **D** increasing

3.3 f has a local minimum at $x = 2$.

(a) State $f'(2)$. [1]

(b) State the sign of f' just left of 2. [1]

(c) State the sign just right of 2. [1]

4 Go further

- work through the **5.8 Sketching Graphs of Functions and Their Derivatives** lesson on the **Learn** page;
- read the **Analytical Applications of Differentiation** section of the AP Calculus AB handout on the **Know** page.

Solutions

2.1 $f' = 0$.

2.2 positive ($f' > 0$).

2.3 f' is increasing.

3.1 B.

3.2 B.

3.3 (a) 0. (b) negative. (c) positive.