Exercise walk-through

Sketching Graphs of Functions and Their Derivatives ▪ 5.8

eXercise

You must be able to

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

Method — 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.

Practice 2.1 ▪ 1 mark

State the value of f' at a local extremum of f.

Solution 2.1

Worked steps

$f' = 0$ B1.

Practice 2.2 ▪ 1 mark

State the sign of f' where f is increasing.

Solution 2.2

Method: Sketching f and f'

Worked steps

positive $(f' > 0)$ B1.

Practice 2.3 ▪ 2 marks

State what f' does where f is concave up.

Solution 2.3

Method: Sketching f and f'

Worked steps

f' is increasing B1 B1.

Exam-style 3.1 ▪ 1 mark

At a local max of f, f' is

A positive

B zero

C negative always

D undefined

Solution 3.1

A positive

B zero ✓

C negative always

D undefined

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

Where f is decreasing, its derivative f' is

A positive

B negative

C zero

D increasing

Solution 3.2

A positive

B negative ✓

C zero

D increasing

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

f has a local minimum at $x = 2$.
(a) State $f'(2)$.
(b) State the sign of f' just left of 2.
(c) State the sign just right of 2.

Solution 3.3

Worked steps

(a) 0 B1. (b) negative B1. (c) positive B1.