

Exercise walk-through

Polynomial Functions and Rates of Change ■ 1.4

eXercise

You must be able to

- identify the **degree** 次数, **leading term** 首项, and **leading coefficient** 首项系数 of a polynomial
- identify **local** 局部 and **global** 全局 maxima and minima

Method — Polynomial functions

$$p(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0.$$

Its **degree** is n , its **leading term** is $a_n x^n$, and its **leading coefficient** is a_n .

Method — Local and global extrema

Where a polynomial switches between increasing and decreasing, it has a **local** (relative) maximum or minimum. The greatest local maximum is the **global** (absolute) maximum; the least local minimum is the global minimum.

Practice 2.1 ■ 2 marks

State the degree and leading coefficient of $p(x) = 3x^4 - 2x + 5$.

Solution 2.1

Method: Polynomial functions

Worked steps

degree 4; leading coefficient 3 **B1** **B1**.

Practice 2.2 ■ 1 mark

Define a local maximum.

Solution 2.2

Method: Local and global extrema

Worked steps

an output value greater than those at nearby inputs (where the function switches from increasing to decreasing) **B1**.

Practice 2.3 ■ 1 mark

State the difference between a local and a global maximum.

Solution 2.3

Method: Local and global extrema

Worked steps

a local maximum is greatest among nearby points; the global maximum is the greatest of all local maxima **B1**.

Exam-style 3.1 ■ 1 mark

The degree of $p(x) = 5x^3 + 2x^2 - 1$ is

A 5

B 3

C 2

D 1

Solution 3.1

A 5

B 3



C 2

D 1

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A polynomial switches from increasing to decreasing at a

- A** zero
- B** local maximum
- C** asymptote
- D** hole

Solution 3.2

Method: Local and global extrema

A zero

B local maximum



C asymptote

D hole

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$p(x) = 2x^5 - 7x + 4.$$

- (a) State the degree.
- (b) State the leading term.
- (c) State the leading coefficient.

Solution 3.3

Method: Polynomial functions

Worked steps

(a) 5 **B1**. (b) $2x^5$ **B1**. (c) 2 **B1**.