

1.4 Polynomial Functions and Rates of Change

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

KEY WORDS local 局部 • degree 次数 • global 全局 • leading coefficient 首项系数
• polynomial 多项式

Objective

Build the skills to answer exam questions on **polynomial functions and rates of change**.

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

1 Worked examples

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

■ 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 .

■ 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.

2 Practice

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

2.2 Define a local maximum. [1]

2.3 State the difference between a local and a global maximum. [1]

3 Exam-style questions

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

- | | |
|---|---|
| A | B |
| C | D |
- A 5
B 3
C 2
D 1

3.2 A polynomial switches from increasing to decreasing at a [1]

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

3.3 $p(x) = 2x^5 - 7x + 4$.

(a) State the degree. [1]

(b) State the leading term. [1]

(c) State the leading coefficient. [1]