AP PRECALCULUS • EXERCISE SHEET

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** 5
- **B** 3
- **C** 2
- **D** 1

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

- **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]

Solutions

2.1 degree 4; leading coefficient 3.

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

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

3.1 B.

3.2 B.

3.3 (a) 5. (b) $2x^5$. (c) 2.