AP STATISTICS • EXERCISE SHEET

2.9 Analyzing Departures from Linearity

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

KEY WORDS influential 有影响的 • transformation 变换 • influential points 影响点 • residual 残差 • slope 斜率

Objective

Build the skills to answer exam questions on **analyzing departures from linearity**.

You must be able to:

- identify **influential points** 影响点, including outliers and **high-leverage** points
- describe how an influential point can change the **slope**, **intercept**, or **correlation**
- recognise when a **transformation** 变换 may straighten a curved pattern

1 Worked examples

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

■ Influential points

An **influential point** noticeably changes the regression results. **High-leverage** points (with extreme x-values) and **outliers** (with large residuals) are common culprits.

■ Their effect

An influential point can shift the **slope**, the **intercept**, or the **correlation** r.

■ Transformations

If the pattern is **curved**, a **transformation** of the data (e.g. taking logs) may straighten it so a linear model fits.

2 Practice

2.1 Define an influential point. [1]

2.2 State what an influential point can change in a regression. [2]

2.3 State one way to straighten a curved pattern. [1]

3 Exam-style questions

3.1 A point that greatly changes the regression line is [1]

- **A** a residual
- **B** an influential point
- **C** the mean
- **D** the median

3.2 A curved relationship can sometimes be straightened by [1]

- **A** adding outliers
- **B** transforming the data
- **C** ignoring x
- **D** using a pie chart

3.3 A single far-off point pulls the regression line strongly toward it.

(a) Name this kind of point. [1]

(b) Name one thing it can change. [1]

(c) State what a transformation of the data aims to do. [1]

Solutions

2.1 a point that noticeably changes the regression results.

2.2 any two of: the slope, the intercept, the correlation.

2.3 transform the data (e.g. take logarithms).

3.1 B.

3.2 B.

3.3 (a) an influential (high-leverage) point. (b) the slope, intercept, or correlation (any one). (c) straighten the curved pattern so a linear model fits.