

# 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 | B |
| C | D |
- 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 | B |
| C | D |
- 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]