

Exercise walk-through

Analyzing Departures from Linearity ■ 2.9

eXercise

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

Method — 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.

Method — Their effect

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

Method — Transformations

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

Practice 2.1 ■ 1 mark

Define an influential point.

Solution 2.1

Worked steps

a point that noticeably changes the regression results **B1**.

Practice 2.2 ■ 2 marks

State what an influential point can change in a regression.

Solution 2.2

Method: Influential points

Worked steps

any two of: the slope, the intercept, the correlation **B1** **B1**.

Practice 2.3 ■ 1 mark

State one way to straighten a curved pattern.

Solution 2.3

Method: Transformations

Worked steps

transform the data (e.g. take logarithms) **B1**.

Exam-style 3.1 ■ 1 mark

A point that greatly changes the regression line is

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

Solution 3.1

Method: Influential points

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

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A curved relationship can sometimes be straightened by

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

Solution 3.2

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



Worked steps

B.

Exam-style 3.3 ■ 1 mark

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

- (a) Name this kind of point.
- (b) Name one thing it can change.
- (c) State what a transformation of the data aims to do.

Solution 3.3

Worked steps

(a) an influential (high-leverage) point **B1**. (b) the slope, intercept, or correlation (any one) **B1**. (c) straighten the curved pattern so a linear model fits **B1**.