

Testing Solutions

1

- (a)
- Correct axes and labels (B1)
 - Correct points plotted (B1)
- (b)
- As height of the footballers increases the weight increases. (B1)
- (c)
- For every 1cm the height increases the weight increases by 1.37 kg. (B1)
- (d)
- $H_0 : \rho = 0$ and $H_1 : \rho > 0$ (B1)
 - $n = 12$, critical value = 0.4973 (B1)
 - $0.81 > 0.4973$ (M1)
 - There is evidence to suggest there is a positive correlation between height and weight. (A1)
- (e)
- Critical value = 0.6581 (B1)
 - $0.81 > 0.6581$, so yes, the conclusion would be the same (B1)

(Total for question 1 is 10 marks)

2

- (a)
- $H_0 : \rho = 0$ (B1)
 - $H_1 : \rho \neq 0$ (B1)
- (b)
- Critical values ± 0.4409 (B1)
 - $0.37 < 0.4409$ There is not enough evidence to suggest that there is a correlation between temperature and rainfall. (B1)

(Total for question 2 is 4 marks)

3

- $H_0 : \rho = 0, H_1 : \rho > 0$ (B1)
- $n = 12$, Critical value = 0.6581 (B1)
- $0.636 < 0.6581$ (M1)
- There is not enough evidence to say that there is a positive correlation between temperature and hours of sunshine. (A1)

(Total for question 3 is 4 marks)

4

- (a)
- $H_0 : \rho = 0$ (B1)
 - $H_1 : \rho \neq 0$ (B1)
- (b)
- $n = 14$, critical values ± 0.5324 (B1)
 - $-0.55 < -0.5324$ (M1)
 - There is evidence to suggest there is a correlation between daily maximum relative humidity and daily mean pressure. (A1)

(Total for question 4 is 5 marks)

5

- (a)
- $H_0 : \rho = 0, H_1 : \rho > 0$ (B1)
 - $n = 10$, Critical value = 0.5494 (B1)
 - $0.67 > 0.5494 \therefore$ There is evidence to suggest a positive correlation between daily sales and daily temperature. (B1)
- (b)
- Yes. There is a positive correlation so a line of best fit can be drawn. (B1)
- (c)
- The temperature. A change in the temperature can cause the sales to increase (not the other way around). (B1)
- (d)
- For every 1°C increase in temperature sales increase by £141. (B1)

(Total for question 5 is 6 marks)

6

- (a)
- $H_0 : \rho = 0, H_1 : \rho < 0, n = 12$ (B1)
 - critical value = -0.4973 (B1)
 - $-0.47 > -0.4973$ There is not enough evidence to suggest that there is a negative correlation. (B1)
- (b)
- The product moment correlation shows a stronger correlation. -0.83 is closer to -1 . (B1)
- (c)
- $\log_{10} y = 0.25 - 0.16 \log_{10} x$ (M1)
 - $\log_{10} y = 0.25 - \log_{10} x^{0.16}$ (M1)
 - $\log_{10}(yx^{0.16}) = 0.25$ (M1)
 - $yx^{0.16} = 10^{0.25}$ (M1)
 - $y = 1.78x^{-0.16}$ so $a = 1.78, b = -0.16$ (A1)

(Total for question 6 is 9 marks)

- 7
- $\log y = \log ax^b$ (M1)
 - $\log y = \log a + \log x^b$ (M1)
 - $\log y = \log a + b \log x$ (A1)

(Total for question 7 is 3 marks)

- 8
- (a)
- $\log_{10} w = 1.99 - 0.031t \implies w = 10^{1.99-0.031t}$ (M1)
 - $w = 10^{1.99} \cdot (10^{-0.031})^t$ (M1)
 - $a = 97.7, b = 0.931$ (A1)
- (b)
- The initial temperature (immediately after the kettle boiled) was 97.7°C . (B1)
- (c)
- The temperature would get closer to zero, instead it should reach room temperature. (B1)

(Total for question 8 is 5 marks)

- 9
- (a)
- 0.98 is close to 1 (B1)
 - This suggests a strong linear relationship between x and $\log y$ (B1)
 - This justifies the use of an exponential model $y = ab^x$ (B1)
- (b)
- $\log_{10} y = 2.60 + 0.127x \implies y = 10^{2.60+0.127x}$ (M1)
 - $y = (10^{2.60})(10^{0.127})^x$ (M1)
 - $a = 398, b = 1.34$ (A1)

(Total for question 9 is 6 marks)

- 10
- $H_0 : \rho = 0, H_1 : \rho > 0$ (B1)
 - $n = 15$, critical value = 0.4409 (B1)
 - $0.455 > 0.4409$ There is evidence to support Will's claim. (B1)

(Total for question 10 is 3 marks)

- 11
- $H_0 : \rho = 0, H_1 : \rho \neq 0$ (B1)
 - $n = 40$, critical values ± 0.3120 (B1)
 - $|-0.289| < 0.3120$ There is not enough evidence to suggest there is a correlation. (B1)

(Total for question 11 is 3 marks)
