Linear Regression Lines

1. The equation is $\hat{y} = 29.59 + 0.37x$. The relationship is positive.

2. See below

3.

$$y = 29.59 + 0.37x \tag{1}$$

$$y = 29.79 + 0.37 \cdot 149 = 85.33 \tag{2}$$

$$y = 29.59 + 0.37 \cdot 86 = \boxed{61.76} \tag{3}$$

4. The formula for calculating the residual is $y_{observed} - y_{predicted}$.

$$y_{observed}(149) = 78 \tag{4}$$

$$Residual(149) = 78 - 85.33 = -7.32 \tag{5}$$

$$y_{observed}(86) - 57 \tag{6}$$

$$Residual(86) = 57 - 61.76 = -4.76 \tag{7}$$

5. See below. No pattern means that the relationship is linear, since there is no constant deviation from the regression; instead, the data is scattered around the line.

6. We have used a regression line and observed residuals to check linearity.

7. Linear and moderate; as said before, the residuals follow no pattern, so the correlation is linear, but the correlation is still not very high, according to the large size of the residuals.

8.
$$y = 23.11 + 0.04x \tag{8}$$

9. See below. Linear, since the data is clustered around the line tightly.

10. $y_{expected} - y_{observed} = 27.41 - 27 = 0.41$. It is above the regression line because the residual is positive

11. See below. The graph is strongly linear since the residuals are low and spread outwards slightly. However, it is too pattern, so there is probably a better curved/exponential fit.

12. It is a strong linear relationship because:

- Data clusters around regression line
- Low residuals
- Very few outliers

13. The least-squares regression line is the line which minimizes the squared residuals.

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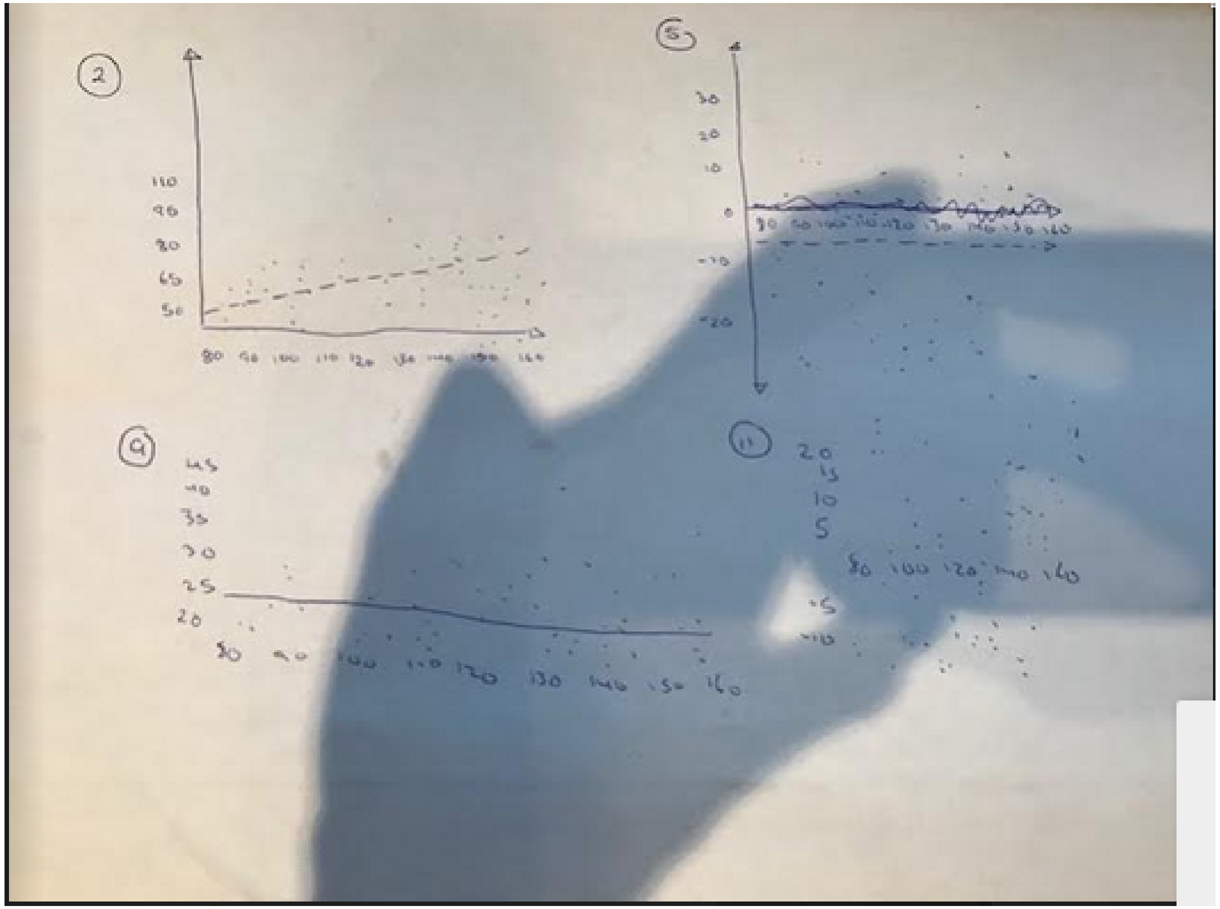
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