Class Exercise

Formulas:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\sqrt{n\sum y^2 - (\sum y)^2}}$$

$$\textit{slope}: \quad b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2} \qquad \textit{intercept}: \quad a = \frac{\sum y - b\sum x}{n}$$

1. **Suitcases**

Bernard Sadow who is credited with inventing the wheeled suitcase in the 1970s struggled to find buyers. He was told that men would consider rolling a suitcase *unmanly* and women would expect their luggage to be carried by men.

The table below shows the approximate weight (in kg) of different suitcases and the corresponding force (in Newtons) required to pull them across a flat surface with wheels:

Weight (kg)	8	10	13	15	19	21	22	25	30	32
Force (N)	9	13	14	17	21	23	23	26	29	30

To help you answer the following questions, we have computed the following values for you:

$$\sum x = 195 \qquad \sum y = 205$$
$$\sum x^2 = 4393 \qquad \sum y^2 = 4651 \qquad \sum xy = 4507$$

a. Calculate the coefficient of correlation, r, for the given data. Comment on the strength and direction of the relationship.

b. Calculate the coefficient of determination, R^2, for the given data. Comment on the amount of variation that is accounted for by this data.

c. Calculate the slope of the least squares line and interpret it in the context of the problem.

d. Calculate the y-intercept of the least squares line and interpret it in the context of the problem.

e. Make a prediction for a suitcase that weighs 20 kg. Is this estimate trustworthy? Why?

f. Make a prediction for a suitcase that weighs 3 kg. Is this estimate reliable? Why?

g. A suitcase that weighs 18 kg actually requires 20 N of force to pull. Calculate the residual and interpret the result.