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**Show your working in all calculations.**

3. This question is related to **Regression**.

Consider the samples below, related to a regression problem.

x	y
1	2
3	5
5	6
7	9

- a) Estimate the linear regression line for these points based on the ordinary least squares formulas.<sup>1</sup>
- b) Draw a scatter plot of the points given in the table, and add the regression line obtained above to your plot.
- c) Based on your model, what would be the expected value of y for x = 20? Please discuss your result.

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<sup>1</sup>The least-squares estimators for the simple linear regression coefficients are calculated as:

$$\hat{\beta}_1 = \frac{\sum_{i=1}^N (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^N (x_i - \bar{x})^2}$$
$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$