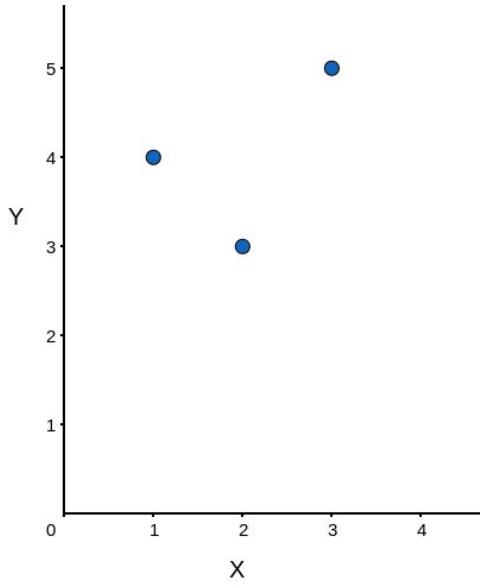
Question2. Cross-validation and Linear regression

Consider the following data set (3 points in the plot below; X is a feature variable, Y is the target variable) of a supervised learning regression problem. We are considering two models for prediction - constant ($\hat{y}(x) = \theta_0$) and linear ($\hat{y}(x) = \theta_0 + \theta_1 x$). We will use the k-fold cross-validation to decide which model is more accurate. We will use the Mean Square Error measure to determine the model prediction error.



2.a. Compute the 3-fold cross-validation error of a constant (zero-degree polynomial) predictor $(\hat{y}(x) = \theta_0)$: 18/12

2.b. Compute the 3-fold cross-validation error of a linear (first-degree polynomial) predictor $(\hat{y}(x) = \theta_0 + \theta_1 x)$: 81/12

Question4. Accuracy, underfitting/overfitting

You trained 4 models on a supervised classification problem. You evaluated their prediction error rate on training data and test data. The results are given in the table below.

	Model 1	**Model 2**	**Model 3**	**Model 4**
Training Accuracy	70%	95%	80%	90%
Test Accuracy	65%	80%	70%	85%

4.a. Which model is the best? Model 4

4.b. Which model is overfitting the most? Model 2

4.c. Which model is underfitting the most? Model 1

Question5. Accuracy, underfitting/overfitting

You trained 4 models on a supervised classification problem. You evaluated their prediction error rate on training data and test data. The results are given in the table below.

	Model 1	**Model 2**	**Model 3**	**Model 4**
Training Error	20%	25%	5%	10%
Test Error	25%	30%	20%	18%

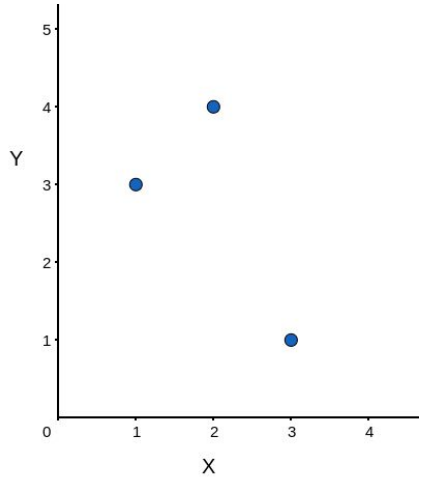
5.a. Which model is the best? Model 4

5.b. Which model is overfitting the most? Model 3

5.c. Which model is underfitting the most? Model 2

Question6. Cross-validation and Linear regression

Consider the following data set (3 points in the plot below; X is a feature variable, Y is the target variable) of a supervised learning regression problem. We are considering two models for prediction - constant ($\hat{y}(x) = \theta_0$) and linear ($\hat{y}(x) = \theta_0 + \theta_1 x$). We will use the k-fold cross-validation to decide which model is more accurate. We will use the Mean Square Error measure to determine the model prediction error.



6.a. Compute the 3-fold cross-validation error of a constant (zero-degree polynomial) predictor $(\hat{y}(x) = \theta_0)$: 42/12

6.b. Compute the 3-fold cross-validation error of a linear (first-degree polynomial) predictor $(\hat{y}(x) = \theta_0 + \theta_1 x)$: 36/3