In [1]:
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To perform regression imputation on the given dataset [1,2,3,4,5,5,6,nan,0]
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To perform regression imputation on the given dataset [1,2,3,4,5,5,6,nan,0]:

Step 1: Split the dataset into a training set and a test set

        The training set will contain all the observations
        except the one with the missing value, while the test set
        will contain only the observation with the missing value.

        Training set: [1, 2, 3, 4, 5, 5, 6, 0]

        Test set: [nan]

Step 2: Fit a linear regression model to the training set

         The dependent variable will be the variable of interest
         (in this case, the missing value),
         and the independent variable will be the index of the observation.

         Represent the training set as two arrays X_train and y_train,
         where X_train represents the index of each observation, and
         y_train represents the dependent variable (i.e., the variable of interest
         in the training set.
```

In [7]:
```
X_train = [ [0], [1], [2], [3], [4], [5], [6], [7] ]
y_train = [ 1, 2, 3, 4, 5, 5, 6, 0 ]
```

In [ ]:
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 Fit a linear regression model to the training set as follows:

y_train = a + bx_train

where a is the intercept, b is the slope of the regression line,
and x_train is the index of each observation in the training set.
```

In [ ]:
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Estimate the values of a and b using the following formulas:


y_train = a + bx_train
b = sum((x_train - mean(x_train)) * (y_train - mean(y_train))) / sum((x_train - mea
a = mean(y_train) - b * mean(x_train)
```

In [ ]:
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b = sum((x_train - 3.5) * (y_train - 3.71)) / sum((x_train - 3.5)^2) = 0.5071
a = 3.71 - b * 3.5 = 1.7714
```

In [ ]:
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So, the fitted regression model is:
```

In [ ]:
```
y_train = 1.7714 + 0.5071 * x_train
```

In [ ]:
```

```

In [ ]:
```
Step 3: Predict the missing value in the test set using the fitted regression model
Fitted regression model to predict the missing value in the test set.
In this case, the missing value is in the 8th position (i.e., index 7).
So, we can predict the missing value as follows:

So, the imputed value for the missing observation is approximately 5.91.
```

In [ ]:
```
y_pred = 1.7714 + 0.5071 * 7 = 5.9057
```

In [ ]:
```
Step 4: Replace the missing value in the original dataset with the predicted value

We can replace the missing value in the original dataset with the predicted value.

The completed dataset is:

[1, 2, 3, 4, 5, 5, 6, 5.91, 0]
```

In [ ]:
```

```