# Classical Data Analysis. Linear Regression Test

1) **Which of the following problems cannot be modeled as a regression problem?**
   a. Predict the value (price) of a car based on its characteristic;
   b. Predict the volume of gas that will be consumed in the next two months;
   ⓒ Predict if a car will be sold within the next 3 months.
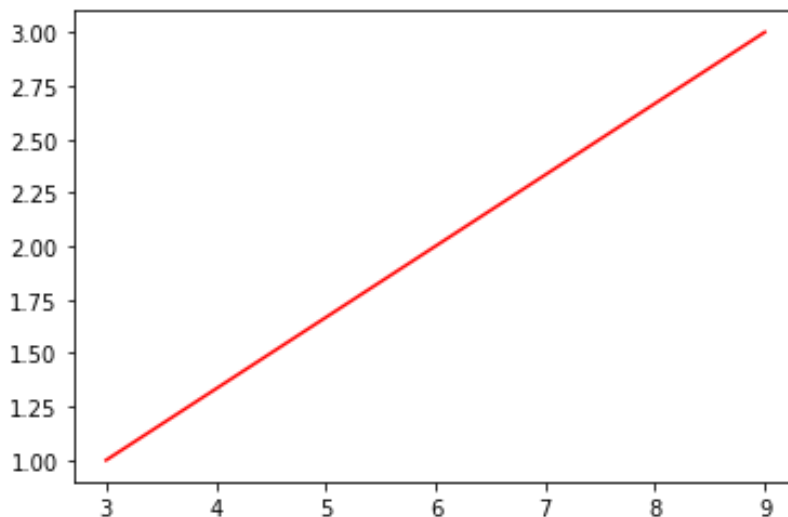   d. None of the above problems can be modeled as a regression problem.

2) **Consider the following dataset:**

| X | y |
|---|---|
| 3 | 1 |
| 6 | 2 |
| 12 | 4 |
| 30 | 10 |

**Considering the linear regression model f(x) = a + b\*x, what are the values of a and b you would expect to better fit the data?**
   a. a=0, b=0
   b. a=3, b=0
   c. a=1, b=3
   ⓓ a=0, b=1/3

3) **Which of the following linear model correspond to that represented in the plot?**



   ⓐ y= 1 + 3\*x
   b. y= (1/3)\*x

c. y= 3/x

d. None of the above

**4) Considering the linear regression model y = a + b*x, which is the dependent variable and which is the independent variable?**

    a. y and x are both dependent

    **b.** y is the dependent variable and x is the independent variable

    c. x is the dependent variable and y is the independent variable

    d. None of the above

**5) In the linear regression model f(x) = 5+6*x which is the intercept and which is the slope of the model?**

    **a.** 5 is the intercept, 6 is the slope

    b. 6 is the intercept, 5 is the slope

    c. The intercept is 0 and the slope is 5/6

**6) In the linear regression model of the exercise 3, is there a relationship between the dependent and the independent variable?**

    a. Yes, there is a negative relationship

    b. No, there is no relationship

    **c.** Yes, there is a positive relationship

**7) If you represent your linear model through a linear function having a negative slope, the relationship between the dependent variable and the independent variable will be:**

    a. The is no relationship between the variables

    b. I don't have enough information to reply

    **c.** There will be a negative relationship between dependent and independent variables.

    d. There will be a positive relationship between dependent and independent variables.

**8) Suppose we set a=-1 and b=5. If your linear model is f(x) = a+ b*x, which is the value of f(5)?**

    a. 25

    **b.** 24

    c. 26

    d. There are not enough information to compute that value

**9) Which of the following metrics can be used to evaluate regression models (multiple choices):**

    **a.** R Squared

    **b.** RMSE / MSE / MAE

    c. nDCG

    d. Accuracy

    e. F Statistics

**10) What are the units of Mean Absolute Error (MAE)?**

    a. The same units as your target variable (the Y).

    **b.** It is just an error, it does not have units.

c. The units of the target squared.

d. None of the above.

11) **How many parameters do you need to estimate in a univariate (one independent variable) linear regression model?**

   a. 1

   b. 2

   c. 0

   d. 3

12) **In a simple linear regression model (one independent variable) $y = 2+0.5*x$, if we change the input variable by 1 unit , which is the change expected in the output variable? (Multiple choices)**

   a. 0.5

   b. 1 unit

   c. the value of the slope

   d. the value of the intercept

13) **Suppose to run the following python code:**

   $x = 2 - 3 * np.random.normal(0, 1, 20)$

   $y = x - 2 * (x ** 2) + 0.5 * (x ** 3) + np.random.normal(-3, 3, 20)$

14) **Which model would you expect would fit best the data points?**

   a. $f(x) = -3 + 3x - 5x^2 + x^3 + 3x^4$

   b. $f(x) = -3 + 4x$

   c. $f(x) = -3 + x - 2x^2 + 0.5x^3$

   d. $f(x) = -3 + x - 2x^2 + 5x^3$

15) **What does the intercept represent in a regression linear model?**

   a. the expected mean value of y when x=0.

   b. A measure of the relationship between x and y

   c. the expected mean value of x when y=0.

   d. None of the above