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;
   c. 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.

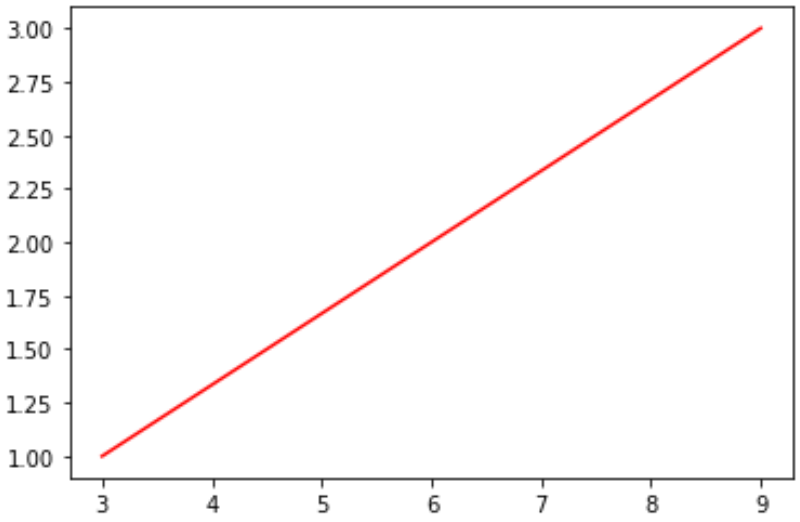
2) **Consider the following dataset:**

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
   d. a=0, b=1/3

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



   a. 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