Data Science for Engineers

Week 6 assignment

For the following set of questions 1, 2, 3, 4, 5, use the dataset **bonds.txt**. This dataset contains 2 variables, Coupon rate and Bid price.

1. What is the relationship between the variables, Coupon rate and Bid price? [1 mark]

   (a) Coupon rate = 99.95 + 0.24 * Bid price

   (b) Bid price = 99.95 + 0.24 * Coupon rate

   (c) Bid price = 74.7865 + 3.066 * Coupon rate

   (d) Coupon rate = 74.7865 + 3.066 * Bid price

   Answer: c

2. Choose the correct option that best describes the relation between the variables Coupon rate and Bid price in the given data. [1 mark]

   (a) Strong positive correlation

   (b) Weak positive correlation

   (c) Strong negative correlation

   (d) Weak negative correlation

   Answer: a

3. What is the R-Squared value of the model obtained in Q1? [1 mark]

   (a) 0.2413

   (b) 0.12

   (c) 0.7516

   (d) 0.5

   Answer: c

4. What is the adjusted R-Squared value of the model obtained in Q1? [1 mark]

   (a) 0.22

   (b) 0.7441

   (c) 0.088

   (d) 0.5

Answer: b

5. Based on the model relationship obtained from Q1, what is the residual error obtained while calculating the bid price of a bond with coupon rate of 3? [1 mark]

   (a) 10.5155
   (b) -10.5155
   (c) 6.17
   (d) 0

   Answer: a

6. State whether the following statement is True or False.[1 mark] Covariance is a better metric to analyze the association between two numerical variables than correlation.

   (a) True
   (b) False

   Answer: b

7. If R^2 is 0.6, SSR=200 and SST=500, then SSE is

   (a) 500
   (b) 200
   (c) 300
   (d) None of the above

   Answer: c

8. Linear Regression is an optimization problem where we attempt to minimize [1 mark]

   (a) SSR (residual sum-of-squares)
   (b) SST (total sum-of-squares)
   (c) SSE (sum-squared error)
   (d) Slope

   Answer: c

9. The model built from the data given below is $Y = 0.2x + 60$. Find the values for R^2 and Adjusted R^2. [1 mark]

X	80	75	85	70	65
Y	85	70	80	95	70

Table 1.2.Q

(a) R^2 is 0.022 and Adjusted R^2 is -0.303

(b) R^2 is 0.022 and Adjusted R^2 is -0.0303

(c) R^2 is 0.022 and Adjusted R^2 is 0.303

(d) None of the above

Answer: a

10. Identify the parameters β_0 and β_1 that fits the linear model $\beta_0 + \beta_1 x$ using the following information: total sum of squares of X, SS_{XX}=52.53, SS_{XY}=52.01, mean of X, $\bar{X}$=4.46, and mean of Y, $\hat{Y}$=6.32. [1 mark]

(a) 1.9 and 0.99

(b) 10.74 and 1.01

(c) 4.42 and 1.01

(d) None of the above

Answer: a