

# April 2 - 2023

# D2 Set

Latent demand in a demand-response curve is the area obtained when?

**Options :**

- 6406531737223. ✓ Price is reduced below the identified optimal price
- 6406531737224. \* Price is increased beyond the identified optimal price
- 6406531737225. \* The optimal price is increased beyond the maximum available price
- 6406531737226. \* Quantity is reduced below the identified optimal quantity
- 6406531737227. \* Quantity is increased beyond the identified maximum quantity

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You solve the primal of a linear program with a maximization objective, three decision variables and two constraints of the less than or equal to type. Non-negativity restrictions apply to the decision variables. After solving the linear program, you find that the first constraint is not binding (LHS < RHS) and the second constraint is binding (LHS = RHS). Which of the following statements is/are correct?

**Options :**

- 6406531737241. \* There are three decision variables in the dual

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- 6406531737242. \* The dual variable corresponding to the second constraint is zero

- 6406531737243. ✓ There are two decision variables in the dual formulation

- 6406531737244. ✓ The dual variable corresponding to the second constraint is non-zero

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In Multiple Linear Regression, the "R" represents \_\_\_\_\_ (choose all those that are applicable)

**Options :**

- 6406531737248. \* Correlation between the dependent variable and all independent variables
- 6406531737249. ✓ Correlation between the actual and predicted values of the dependent variable
- 6406531737250. \* Correlation between the predicted value of the dependent variable and the actual value of the independent variable
- 6406531737251. \* Correlation between the errors
- 6406531737252. \* Correlation between the actual and predicted value of any given independent variable
- 6406531737253. \* Correlation between the actual value of the dependent variable and the predicted value of the errors
- 6406531737254. \* None of these

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The price and demand for a product are provided in Table 1. The linear regression model is fit for this data in excel, and the output is given in Table 2. Using this information, answer the given subquestions.

Price	Demand
10	9703
15	4701
20	2284
25	2137
30	1036
35	503
40	144
45	111
50	54

Table-1

Regression Model Parameter	Value
R-Squared	0.7084
Observations	9
Intercept	8125
Co-efficient (Beta-1)	-194.27
S.E of Intercept	1538.44
S.E of Co-efficient (Beta-1)	47.10

Table-2

What is the total market size?

8125

Demand equation can be formed as,

$$D(p) = 8125 - 194.27(p)$$

$D(0)$  gives total market size

$$\Rightarrow D(0) = 8125 - 194.27(0)$$

$$\Rightarrow \underline{\underline{8125}}$$

What is the satiating price for the price-demand data based on the fitted model (Note: If your answer is in decimal, enter it rounded to two decimal places. For example, if your answer is "10.256", enter it as "10.26")

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

41.60 to 42.00

$D(p) = 0$ , gives the satiating price

$$\Rightarrow 8125 - 194.27(p) = 0$$

$$\Rightarrow p = \frac{8125}{194.27} = \underline{\underline{41.82}}$$

What is the elasticity of the (regression line) demand, when the price is Rs. 33 (round to two decimal places)? (Note: If your answer is in decimal, enter it rounded to two decimal places. For example, if your answer is "10.256", enter it as "10.26")

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

3.60 to 3.80

$$\text{Elasticity} = - \frac{\frac{d_2 - d_1}{d_1}}{\frac{p_2 - p_1}{p_1}}$$

We will take satiating price as

$$\Rightarrow D(p_2) = 0 = d_2$$

$$p_1 = 33,$$

$$\Rightarrow D(p_1) = 8125 - 194.27(33)$$

$$\Rightarrow 1714.09 = d_1$$

$$\Rightarrow \text{Elasticity} = - \frac{\frac{0 - 1714.09}{1714.09}}{\frac{41.82 - 33}{33}} = - \frac{1}{\frac{8.82}{33}} = \frac{33}{8.82} \hat{=} \underline{\underline{3.75}}$$

At the price of Rs. 33, based on the elasticity (of the regression line) \_\_\_\_\_

**Options :**

6406531737231. ✓ Demand is elastic

6406531737232. \* Demand is inelastic

6406531737233. \* Demand indicates luxury item

6406531737234. \* Demand indicates inferior item

As the price moves to the satiating price, then elasticity \_\_\_\_\_?

**Options :**

6406531737235. \* Decreases

6406531737236. ✓ Increases

6406531737237. \* Remains the same

6406531737238. \* Increases then decreases

6406531737239. \* Decreases then increases

You have estimated the demand to follow the following relationship:  $D(p) = 100 - p$ . Now, you intend to maximize the revenue  $R(p) = D(p) \cdot p$ . You find the first derivative of  $R(p)$  with respect to  $p$ , equate it to 0 and find  $p^*$ . What is the value of  $p^*$ ? 49.9 to 50.1 → Answer

Direct formula to maximize revenue is,

$$\frac{D_0}{2m}$$

General equation of demand is,

$$D(p) = D_0 - mp$$

Here,

$$D_0 = 100 \text{ and}$$

$$m = 1$$

$$\Rightarrow \text{Max revenue} = \frac{100}{2} = 50$$

A multiple linear regression model, as specified below is fit on a data set with 150 data points.

$$\text{MLR Model: } Y = 2.1 + 1.4 * X_1 - 4.2 * X_2 + 0.5 * X_3 + \varepsilon$$

$n$  = number of data points

$k$  = number of explanatory variables ( $X_1, X_2, X_3, \dots$ )

Based on the above data, answer the given subquestions.

How many degrees of freedom are present for the "Residuals" in the ANOVA Table?

146

Here,  $n = 150$

$$k = 3 (X_1, X_2, X_3)$$

$$\text{Residuals} = n - k - 1 = 150 - 3 - 1 = \underline{\underline{146}}$$

How many degrees of freedom are present for the "Regression" in the ANOVA Table?

3

degrees of freedom of Regression =  $k$

$$\Rightarrow \text{Here } \underline{\underline{k = 3}}$$

How many total degrees of freedom are present for the fitted model in the ANOVA Table?

149

$$\begin{aligned} \text{Total degrees of freedom} &= \text{d.o.f. of Residuals} + \text{d.o.f. of Regression} \\ &\Rightarrow 146 + 3 = \underline{\underline{149}} \end{aligned}$$

Direct formula is =  $n - k - 1 + k$

$$\Rightarrow \underline{\underline{n - 1}}$$

Company "ABC" manufacturer's product "X". Currently, the quality inspection of "X" is done manually through visual inspection. The aim of the quality inspection process is to identify defective products. From historical experience, manual visual inspection correctly identified 75% of defective items in any given batch of only defective items.

The management has decided to replace manual visual inspection with an automatic detection system (ADS). This ADS runs a logistic model in the background for classifying an item as defective or non-defective based on photos taken by a camera. To test the ADS, a sample of 100 units of X is taken. 30% of the sample contains defective items. The samples are passed through the ADS, and the system identifies 20% of the non-defective items as defective and 10% of the defective items as non-defective.

How many "True Positives" is ADS predicting?

$\circ = \text{defective}$

27

$\mid = \text{non-defective}$

Given,

$$\text{datapoints } (n) = 100$$

$$\text{no. of defective items} = 30\% \text{ of } 100 = 30 = (\text{TP} + \text{FP})$$

$$\Rightarrow \text{no. of non-defective items} = (100 - 30) = 70 = (\text{TN} + \text{FN})$$

		Actual	
		$\mid$	$\circ$
Predicted	$\mid$	27	14
	$\circ$	3	56
	TP	FP	
	FN	TN	

20% of non-defective is identified as defective

$$\Rightarrow 20\% \text{ of } 70 = 14 = \text{FP}$$

10% of defective items were identified as non-defective

$$\Rightarrow 10\% \text{ of } 30 = 3 = \text{FN}$$

We know,

$$\text{TP} + \text{FN} = 30$$

$$\Rightarrow \text{TP} = 30 - 3 = 27$$

$$\text{TN} + \text{FP} = 70$$

$$\Rightarrow \text{TN} = 70 - 14 = 56$$

How many "False Positives" is ADS predicting?

14

How many "True Negatives" is ADS predicting?

56

How many "False Negatives" is ADS predicting?

3

Predicted Label	Real Label		Precision = $\frac{\sum \text{TP}}{\sum \text{TP} + \text{FP}}$
	Positive	Negative	
Actual Label	Positive	True Positive (TP)	False Positive (FP)
	Negative	False Negative (FN)	True Negative (TN)

$$\text{Recall} = \frac{\sum \text{TP}}{\sum \text{TP} + \text{FN}}$$

$$\text{Accuracy} = \frac{\sum \text{TP} + \text{TN}}{\sum \text{TP} + \text{FP} + \text{FN} + \text{TN}}$$

What is the accuracy of the ADS? (Note: Enter the answer as a numeric percentage value rounded to two decimal places without the % symbol. For example, if your answer is "10.256 %", enter it as "10.26")

82.00 to 84.00

$$\Rightarrow \frac{TP + TN}{Total} = \frac{83}{100} = 0.83 = 83\%$$

What is the precision of the ADS when predicting defective products? (Note: Enter the answer as a numeric percentage value rounded to two decimal places without the % symbol. For example, if your answer is "10.256 %", enter it as "10.26")

65.00 to 67.00

$$\Rightarrow Precision = \frac{TP}{TP + FP} = \frac{27}{41} = 0.658 = 65.8\%$$

What is the recall of the ADS when predicting non-defective products? (Note: Enter the answer as a numeric percentage value rounded to two decimal places without the % symbol. For example, if your

79.00 to 81.00

$$\Rightarrow Recall = \frac{TP}{TP + FN} = \frac{27}{30} = 0.9 = 90\%$$

Question Label : Multiple Select Question

Should ADS be implemented?

Options :

6406531737262. \* Yes, the precision of ADS in predicting defects is higher than the current manual visual inspection

6406531737263. \* No, the precision of ADS in predicting defects is lower than the current manual visual inspection

6406531737264. ✓ Yes, the recall of ADS in predicting defects is higher than the current manual visual inspection

6406531737265. \* No, the recall of ADS in predicting defects is lower than the current manual visual inspection

6406531737266. \* Yes, the precision of ADS in predicting non-defects is higher than the current manual visual inspection

6406531737267. \* No, the precision of ADS in predicting non-defects is lower than the current manual visual inspection

6406531737268. \* Yes, the recall of ADS in predicting non-defects is higher than the current manual visual inspection

6406531737269. \* No, the recall of ADS in predicting non-defects is lower than the current manual visual inspection

# Nov 20 - 2022

# OPDI

You are given the following contingency table based on sample data with people belonging to two cities (City A and City B) and their brand preferences. You perform a chi-squared test of independence to make inferences about the population from this sample.

	Brand A	Brand B	Brand C	Brand D	Total
City A	155	145	234	126	660
City B	85	98	97	89	369
	240	243	331	215	1029

Based on the above data, answer the given subquestions.

From the given contingency table, find the expected frequency of people belonging to City B preferring brand C?

**Response Type :** Numeric

$$\Rightarrow \text{Expected value} = \frac{331 \times 369}{1029}$$

$$\Rightarrow 118.69$$

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

115 to 121

Expected values

What is the calculated value of chi-squared?

**Response Type :** Numeric

$$\Rightarrow \text{Brand A} \quad \text{Brand B} \quad \text{Brand C} \quad \text{Brand D}$$

$$\begin{array}{l} \text{City} \\ \text{A} \end{array} \quad 153.93 \quad 155.86 \quad 212.30 \quad 137.90$$

$$\begin{array}{l} \text{City} \\ \text{B} \end{array} \quad 86.06 \quad 87.13 \quad 118.69 \quad 77.09$$

$$\Rightarrow 0.007 + 0.25 + 2.21 + 1.02 +$$

$$0.01 + 1.35 + 3.96 + 1.84$$

$$\Rightarrow 11.147$$

T L C  
 ↓ ↓ →  
 Tabulated less than calculated

Here,

$$\text{Tabulated} = 7.814$$

$$\text{Calculated} = 11.147$$

$$\Rightarrow 7.814 < 11.147$$

⇒ Reject Null

You are solving a regression problem with 4 explanatory variables. The data has 40 observations and the R-square value was found to be 0.74.

Based on the above data, answer the given subquestions.

What is the value of adjusted R-square (round off to two decimal values)?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0.71

$$\Rightarrow R_{Adj} = 1 - \frac{(1-R^2) \times (n-1)}{n-k-1}$$

Here,

$$R^2 = 0.74$$

$$n-1 = 39$$

$$n-k-1 = 35$$

$$\Rightarrow R_{Adj} = 1 - \frac{0.26 \times 39}{35}$$

$$\Rightarrow R_{Adj} \approx 0.710$$

You are adding a new explanatory variable to the dataset and the new adjusted R squared value is

0.745. Is the new variable significant?

**Options :**

6406531485077. \* Yes

6406531485078. \* No

6406531485079. ✓ Calculation error in Adjusted R Squared value

You are removing a few explanatory variables from the dataset and the new adjusted R square value is -0.21. Is it possible?

**Options :**

6406531485080. ✓ Yes. Adjusted R squared value can be negative

6406531485081. \* No. Calculation error

6406531485082. \* None of these

Using the confusion matrix, answer the given subquestions

n = 165	Predicted: No	Predicted: Yes
Actual: No	50 TN	10 FP
Actual: Yes	5 FN	100 TP

Calculate the precision.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.90 to 0.92

$$\Rightarrow Precision = \frac{TP}{TP + FP}$$

$$\Rightarrow \frac{100}{100+10} = \frac{100}{110} \approx 0.909$$

Calculate the recall.

Response Type : Numeric

Evaluation Required For SA : Yes

$$\text{Recall} = \frac{TP}{TP + FN}$$

$$\Rightarrow \frac{100}{100 + 5} = \frac{100}{105} \approx 0.952$$

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.94 to 0.96

Suppose a factory manufactures products on three machines A, B and C. Suppose 25% of total output comes from machine A, 20% of total output comes from machine B and 55% of total output comes from machine C. From the past data, it is known that 8% of products by machine A are defectives, 15% of products by machine B are defectives and 5% of products by machine C are defectives. What is the probability that the product has come from machine C given that it is a defective?

A	B	C
Output 25%	20%	55%
Defectives 8%	15%	5%

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.32 to 0.38

$$\text{Find: } P(\text{Defective} | C)$$

$$\Rightarrow P(\text{Defective} | C) = \frac{P(C | \text{Defective}) \cdot P(C)}{P(\text{Defective})}$$

$$\Rightarrow \frac{0.05 \times 0.55}{0.25 \times 0.08 + 0.2 \times 0.15 + 0.55 \times 0.05}$$

$$\Rightarrow \frac{0.0275}{0.02 + 0.03 + 0.0275} \approx 0.354$$

What is the meaning of an Elasticity of 2?

Options :

6406531485060. ✓ 10% reduction in price will yield a 20% increase in sales

6406531485061. ✗ 10% reduction in price will yield a 20% decrease in sales

6406531485062. ✗ 25% increase in price will yield 50% increase in sales

6406531485063. ✓ 25% increase in price will yield 50% decrease in sales

Select the correct option from below:

Options :

6406531485068. ✗ For inelastic product demand ( $\epsilon < 1$ ) the revenue can be increased by setting price close to zero.

6406531485069. ✓ For elastic product demand ( $\epsilon > 1$ ) the revenue can only be increased by setting price close to zero

6406531485070. ✓ For inelastic product demand ( $\epsilon < 1$ ) the revenue can be increased by simply increasing the prices

6406531485071. ✗ For elastic product demand ( $\epsilon > 1$ ) the revenue can only be increased by simply increasing the prices

Which of the following data will you use to calculate price elasticity?

**Options :**

6406531485064. \* Protein-powder sales increases by 10% when the national income grows by 15%.

6406531485065. \* Tea sales increases by 10% when daily average working hours of employees goes up by 2 hrs .

6406531485066. ✓ Paneer (Indian Cottage Cheese) sales go down by 10% when price goes up from Rs.100 to Rs.120 per 200 gram.

6406531485067. \* All of these

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In Multiple Linear Regression, if the explanatory variables are highly correlated, then that phenomenon is called

**Options :**

6406531485072. \* Normality

6406531485073. \* Singularity

6406531485074. ✓ Collinearity

6406531485075. \* Variation Inflation

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What is called as efficiency?

**Options :**

6406531485085. \* Output/(1-input)

6406531485086. \* 1 - (output/input)

6406531485087. ✓ Output/Input

6406531485088. \* None of these

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July 10-2022

OPE 1

Suppose you conduct a chi-squared test of independence on the categorical variables cities and brand preferences at the significance level 0.05. You obtain a p-value of 0.07. What will you conclude?

**Options :**

6406531166472. ❌ Reject the null hypothesis and conclude that the categorical variables are

independent

6406531166473. ❌ Reject the null hypothesis and conclude that the categorical variables are not independent

6406531166474. ✓ Fail to reject the null hypothesis and conclude that the categorical variables are independent

6406531166475. ❌ Fail to reject the null hypothesis and conclude that the categorical variables are not independent

There are 4 business units. Using the DEA, you solve the LP for all the four business units and find the efficiencies for these units. The efficiency is denoted by E. For these units,  $E_1 = 0.83$ ,  $E_2 = 1$ ,  $E_3 = 0.57$ ,  $E_4 = 0.91$ . Which of these units are efficient?

**Options :**

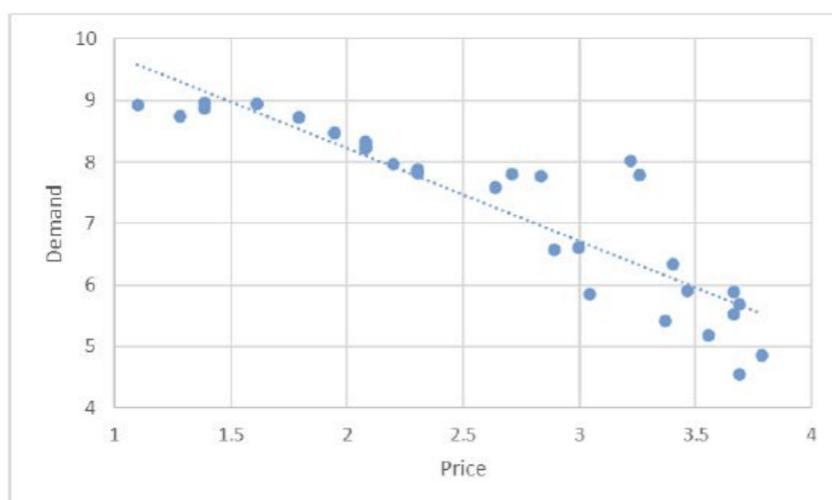
6406531166479. ❌ Unit 1

6406531166480. ✓ Unit 2

6406531166481. ❌ Unit 3

6406531166482. ❌ Unit 4

You construct a linear regression on a price-demand dataset and observe the following trend.



After observing the above figure, choose which of the following statements are true?

**Options :**

6406531166487. ❌ The intercept and the slope of this regression are both negative

6406531166488. ❌ The intercept and the slope of this regression are both positive

6406531166489. ❌ The intercept is negative and the slope is positive

6406531166490. ✓ The intercept is positive and the slope is negative

You solve the primal of a linear program with maximization objective, three decision variables and two constraints of the less than or equal to type. Non-negativity restrictions apply on the decision variables. After solving the linear program, you find that the first constraint is binding (lhs = rhs) and the second constraint is not binding (lhs < rhs). Which of the following statements are correct?

**Options :**

6406531166483. ✓ There are two decision variables in the dual

6406531166484. ✓ The dual variable corresponding to the second constraint is zero

6406531166485. ✗ There are three decision variables in the dual

6406531166486. ✗ The dual variable corresponding to the first constraint is zero

You have estimated the demand to follow the following relationship:

$D(p) = 60 - 5 * p$ . Now, you intend to maximize the revenue

$R(p) = D(p) * p$ . You find the first derivative of  $R(p)$  with respect to  $p$ , equate it to 0 and find  $p^*$ . What is the value of  $p^*$ ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5.9 to 6.1

Given,

$$D(p) = 60 - 5p$$

General demand equation is given by,

$$D(p) = D_0 - mp$$

$$\Rightarrow \text{Here } D_0 = 60,$$

$$m = 5$$

Direct formula for  $p^*$  is,

$$p^* = \frac{D_0}{2m} = \frac{60}{2 \times 5} = \underline{\underline{6}}$$

In a multiple linear regression with 4 explanatory variables, you find that R-squared value is 0.7.

The number of observations is 25. What is the value of adjusted R-squared?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.62 to 0.66

$$R_{\text{adj}} = 1 - \frac{(1-R^2)(n-1)}{n-k-1}$$

Here,

$$n = 25,$$

$$R^2 = 0.7$$

$$k = 4$$

$$\Rightarrow R_{\text{adj}} = 1 - \frac{(1-0.7)(24)}{(20)}$$

$$\Rightarrow 1 - 0.37 \times 1.2$$

$$\Rightarrow 1 - 0.36$$

$$\Rightarrow \underline{\underline{0.64}}$$

You are conducting a multiple linear regression with sales as the dependent variable. Price, quantity and rating score are the independent variables. In order to calculate the VIF for the variable rating score, you implement a linear regression with rating score as the dependent variable and other variables as independent variables and obtain R-squared of 0.3. What is the VIF for the variable rating score?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

1.38 to 1.44

$$VIF = \frac{1}{1 - R^2}$$

$$\Rightarrow \frac{1}{1 - 0.3} = \frac{1}{0.7} \approx 1.42$$

Please use the confusion matrix below to answer the given subquestions.

Sample = 100	Predicted (No)	Predicted (Yes)
Actual (No)	35	15
Actual (Yes)	5	45

TN      FP  
FN      TP

**Sub questions**

**Question Number :** 239 **Question Id :** 640653351471 **Question Type :** SA **Calculator :** None

**Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

**Correct Marks :** 1

**Question Label :** Short Answer Question

The accuracy of the classification model according to the confusion matrix is: \_\_\_\_\_

Hint: Enter your answer in %. If your answer is 12%, just enter 12

80

$$\text{Accuracy} = \frac{TP + TN}{\text{Total}} = \frac{35 + 45}{100} = 0.8 = 80\%$$

The precision of the model with respect to the class (Yes) is: \_\_\_\_\_

Hint: Enter your answer in %. If your answer is 12%, just enter 12

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

$$\Rightarrow \text{Precision} = \frac{TP}{TP + FP}$$

$$\Rightarrow \frac{45}{45 + 15} = \frac{45}{60} = 0.75 = 75\% \quad //$$

**Text Areas :** PlainText

**Possible Answers :**

75

The recall of the model with respect to class (Yes) is: \_\_\_\_\_

Hint: Enter your answer in %. If your answer is 12%, just enter 12

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

90

$$\text{Recall} = \frac{TP}{TP + FN}$$

$$\Rightarrow \frac{45}{50} = 0.9 = 90\% \quad //$$

MARCH 13 2022

QP B1

Latent demand in a demand-response curve is the area obtained when?

**Options :**

- A. ✓ Price is reduced below the identified optimal price
  - B. ✗ Price is increased beyond the identified optimal price
  - C. ✗ The optimal price is increased beyond the maximum available price
- 
- D. ✗ Quantity is reduced below the identified optimal quantity
  - E. ✗ Quantity is increased beyond the identified maximum quantity

The price and demand for a product are provided in Table-1 below. The linear regression model is fit for this data in excel, and the output is as given in Table-2. Given this information, answer the given subquestions

Price	Demand
10	9703
15	4701
20	2284
25	2137
30	1036
35	503
40	144
45	111
50	54

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.841686				
R Square	0.708436				
Adjusted R Square	0.666784				
Standard Error	1824.364				
Observations	9				
ANOVA					
	df	SS	MS	F	Significance F
Regression	1	56609307	56609307	17.00846	0.004437
Residual	7	23298125	3328304		
Total	8	79907432			
	Coefficients	Standard Error	t Stat	P-value	Lower 95% Upper 95%
Intercept	8125	1538.439	5.281328	0.001146	4487.171 11762.83
X Variable 1	-194.267	47.10487	-4.12413	0.004437	-305.652 -82.8813

Demand equation can be given as,

$$D(p) = 8125 - 194.267(p)$$

What is the total market size?

$$\text{Market size} = D(0)$$

NOTE: Enter your answer to the

$$\Rightarrow D(0) = 8125 - 194.267(0)$$

$$\Rightarrow \underline{\underline{8125}}$$

Response Type : Numeric

Evaluation Required For SA :

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

8125

What is the satiating price for the price-demand data based on the fitted model (round your answer to one decimal place)?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

41.79 to 41.82

Satiating Price is when,  
 $D(p) = 0$

$$\Rightarrow 8125 - 194.267(p) = 0$$

$$\Rightarrow p = \frac{8125}{194.267} \approx 41.82$$

What is the elasticity of demand, when the price is Rs.22 (round to two decimal places)?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

We will take satiating price

as  $p_2$

$$\Rightarrow d_2 = D(\text{satiating price}) = 0$$

**Answers Type :** Range

$$\Rightarrow p_1 = 22$$

**Text Areas :** PlainText

$$\Rightarrow d_1 = D(22) = 8125 - 194.267(22)$$

**Possible Answers :**

0.34 to 0.35

$$\Rightarrow 3851.126$$

$$\Rightarrow \text{Elasticity} = -\frac{\frac{d_2 - d_1}{d_1}}{\frac{p_2 - p_1}{p_1}} = -\frac{\frac{0 - 3851.126}{3851.126}}{\frac{41.82 - 22}{22}} = \frac{22}{19.82} \approx 1.10$$

At the price of Rs. 22, based on the elasticity \_

**Options :**

- A. ✘ Demand is elastic → should be elastic
- B. ✓ Demand is inelastic
- C. ✘ Demand indicates luxury item
- D. ✘ Demand indicates inferior item

As the price moves to the satiating price, then elasticity \_?

**Options :**

- A. ✘ Decreases
- B. ✓ Increases
- C. ✘ Remains same
- D. ✘ Increases then decreases
- E. ✘ Decreases then increases

What is the magnitude of correlation (along with direction) that exists between the price and demand (round your answer to two decimal places)?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

-0.85 to -0.84

$$\text{Correlation} = \text{Multiple } r \times \text{(sign of slope)}$$

$$\Rightarrow \text{Multiple } r = 0.841$$

$$\Rightarrow \text{sign of slope} = -1$$

$$\Rightarrow \text{Correlation} = 0.841 \times -1$$

$$\Rightarrow -0.841$$

The fitted regression model

**Options :**

- A.  Is significant at a 95% confidence level
- B.  Is not significant at a 95% confidence level
- C.  Has an accuracy of ~70.84%
- D.  Has an accuracy of ~66.67%

A data scientist is interested to see if the demand for the product is exponential in nature. Accordingly, the expected demand at various prices is calculated and presented in the table below. Given this information, what is the value of the chi-square goodness of fit test statistic that will be computed? (round to two decimal places)

{Hint: Chi-square =  $\sum_k \frac{(observed_k - Expected_k)^2}{Expected_k}$ }

Price	Expected Demand
10	9820
15	5232
20	2213
25	2045
30	1162
35	620
40	267
45	123
50	34

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

167.00 to 167.06

If the p-value for the computed test statistic is 0.0524, then at which of the following significance levels, will you reject the null (select all that is applicable)?

**Options :**

- A.  1%
- B.  5%
- C.  10%
- D.  15%
- E.  20%

If the tabulated Chi-Squared value provided is 157, then what will be the conclusion of the test?

**Options :**

- A. ✘ This sample is distributed exponentially
- B. ✘ This sample is not distributed exponentially
- C. ✘ The population distribution of demand is exponential
- D. ✓ The population distribution of demand is not exponential

You are given the following contingency table based on sample data where different cities and their brand preferences are provided. You perform a chi-squared test of independence to make inferences about the population from this sample. Using your computations, answer the given subquestions.

Note: Round off to two decimal values at all the intermediate iterations and the final step.

	Brand A	Brand B	Total
Chennai	288	124	412
Mumbai	622	204	826
Total	910	328	1238

From the given contingency table, find the expected frequency of Chennai people preferring brand B?

NOTE: Enter your answer to the nearest integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

→ should be around 109

At the significance level 0.01, chi-squared tabular value is 6.63. What do you conclude?  
**Options :**

- A. ✘ Reject the null hypothesis and conclude that the categorical variables are independent
- B. ✓ Fail to reject the null hypothesis and conclude that the categorical variables are independent
- C. ✘ Reject the null hypothesis and conclude that the categorical variables are not independent
- D. ✘ Fail to reject the null hypothesis and conclude that the categorical variables are not independent

Expected Values

Brand A      Brand B

Chennai      302.84      109.156

Mumbai      607.156      218.84

$$\Rightarrow \chi^2 = 0.727 + 2.018 + \\ 0.362 + 1.00$$

$$\Rightarrow 4.107$$

T L C = Reject Null

Tabulated less than calculated

Here,

$$\text{Tabulated} = 6.63$$

$$\text{calculated} = 4.107$$

$$6.63 \not< 4.107$$

Suppose a factory manufactures products on two machines A and B. Suppose 65% of total output comes from machine A, 30% of total output comes from machine B and 5% of total output comes

from machine C. From the past data, it is known that 12% of products by machine A are defectives, 12% of products by machine B are defectives and 10% of products by machine C are defectives. What is the probability that the product has come from machine B given that it is defective?

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.22 to 0.36

Similar question done

Above

Which of the following statements are true regarding PP and QQ plots when they are used to compare the model distribution and sample distribution (select all that are applicable)

**Options :**

- A. ✘ PP plot amplifies differences between tails and QQ plot amplifies the difference at the middle portion
- B. ✓ QQ plot amplifies differences between tails and PP plot amplifies the difference at the middle portion
- C. ✘ Both PP and QQ plots amplify both differences (in tails and middle portion)
- D. ✘ Both PP and QQ plots do not amplify any differences (in tails and middle portion)
- E. ✘ PP and QQ plots are both 45degree straight lines when the model distribution and sample distribution are not correctly fitted
- F. ✓ PP and QQ plots are both 45degree straight lines when the model distribution and sample distribution are correctly fitted

Which of the following are not required to build an empirical distribution?

**Options :**

- A. ✘ PDF or PMF
- B. ✘ Sample data
- C. ✘ Summary Statistics
- D. ✓ None of these