



---

## **PREDICTING RESTAURANT TIPS USING PREDICTIVE ANALYTICS ON EXCEL.**

---

PROJECT 2



FEBRUARY 13, 2023

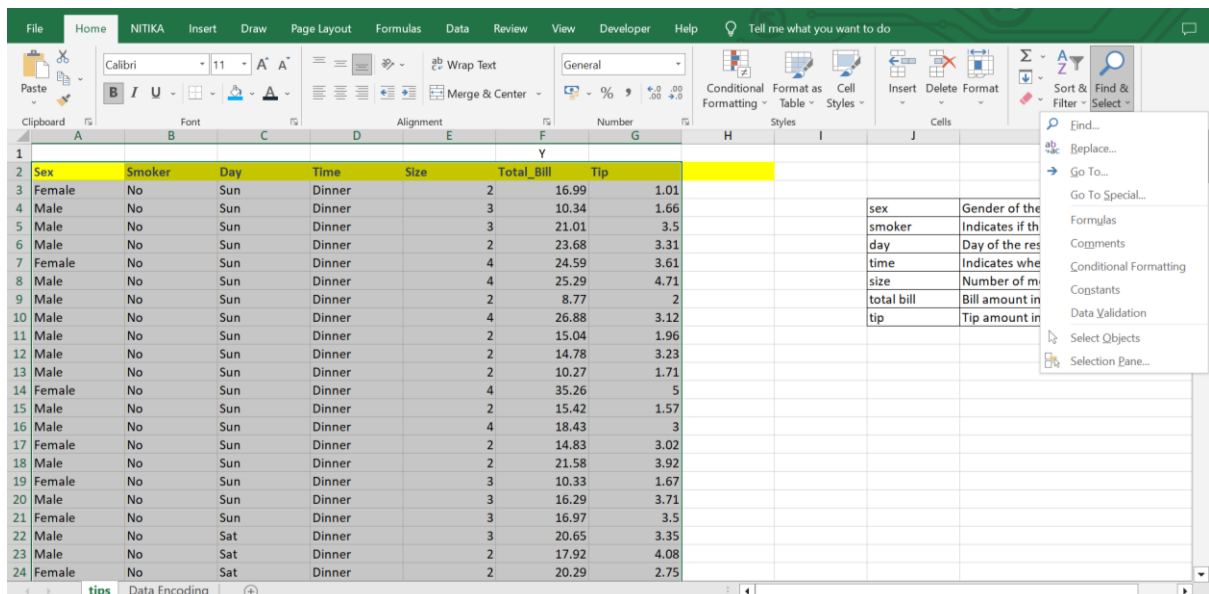
## Description:

The dataset in file **Restaurant tips dataset.xlsx** contains tips data for different customers. The following are the features in the dataset:

|            |   |
|------------|---|
| sex        | Gender of the customer                            |
| smoker     | Indicates if the customer is a smoker or not      |
| day        | Day of the restaurant visit                       |
| time       | Indicates whether the tip was for lunch or dinner |
| size       | Number of members dining                          |
| total bill | Bill amount in USD                                |
| tip        | Tip amount in USD                                 |

The following project tasks are required to be performed in excel:

1. Find out if there are any missing values and clean the data.



|    | A      | B      | C   | D      | E    | F          | G    | H | I | J |
|----|--------|--------|-----|--------|------|------------|------|---|---|---|
| 1  |        |        |     |        |      |            |      |   |   |   |
| 2  | Sex    | Smoker | Day | Time   | Size | Total_Bill | Tip  |   |   |   |
| 3  | Female | No     | Sun | Dinner | 2    | 16.99      | 1.01 |   |   |   |
| 4  | Male   | No     | Sun | Dinner | 3    | 10.34      | 1.66 |   |   |   |
| 5  | Male   | No     | Sun | Dinner | 3    | 21.01      | 3.5  |   |   |   |
| 6  | Male   | No     | Sun | Dinner | 2    | 23.68      | 3.31 |   |   |   |
| 7  | Female | No     | Sun | Dinner | 4    | 24.59      | 3.61 |   |   |   |
| 8  | Male   | No     | Sun | Dinner | 4    | 25.29      | 4.71 |   |   |   |
| 9  | Male   | No     | Sun | Dinner | 2    | 8.77       | 2    |   |   |   |
| 10 | Male   | No     | Sun | Dinner | 4    | 26.88      | 3.12 |   |   |   |
| 11 | Male   | No     | Sun | Dinner | 2    | 15.04      | 1.96 |   |   |   |
| 12 | Male   | No     | Sun | Dinner | 2    | 14.78      | 3.23 |   |   |   |
| 13 | Male   | No     | Sun | Dinner | 2    | 10.27      | 1.71 |   |   |   |
| 14 | Female | No     | Sun | Dinner | 4    | 35.26      | 5    |   |   |   |
| 15 | Male   | No     | Sun | Dinner | 2    | 15.42      | 1.57 |   |   |   |
| 16 | Male   | No     | Sun | Dinner | 4    | 18.43      | 3    |   |   |   |
| 17 | Female | No     | Sun | Dinner | 2    | 14.83      | 3.02 |   |   |   |
| 18 | Male   | No     | Sun | Dinner | 2    | 21.58      | 3.92 |   |   |   |
| 19 | Female | No     | Sun | Dinner | 3    | 10.33      | 1.67 |   |   |   |
| 20 | Male   | No     | Sun | Dinner | 3    | 16.29      | 3.71 |   |   |   |
| 21 | Female | No     | Sun | Dinner | 3    | 16.97      | 3.5  |   |   |   |
| 22 | Male   | No     | Sat | Dinner | 3    | 20.65      | 3.35 |   |   |   |
| 23 | Male   | No     | Sat | Dinner | 2    | 17.92      | 4.08 |   |   |   |
| 24 | Female | No     | Sat | Dinner | 2    | 20.29      | 2.75 |   |   |   |

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

A2 Sex

|    | A      | B      | C   | D      | E    | F          | G    | H | I | J | K |
|----|--------|--------|-----|--------|------|------------|------|---|---|---|---|
| 1  |        |        |     |        |      | Y          |      |   |   |   |   |
| 2  | Sex    | Smoker | Day | Time   | Size | Total_Bill | Tip  |   |   |   |   |
| 3  | Female | No     | Sun | Dinner | 2    | 16.99      | 1.01 |   |   |   |   |
| 4  | Male   | No     | Sun | Dinner | 3    | 10.34      | 1.66 |   |   |   |   |
| 5  | Male   | No     | Sun | Dinner | 3    | 21.01      | 3.5  |   |   |   |   |
| 6  | Male   | No     | Sun | Dinner | 2    | 23.68      | 3.31 |   |   |   |   |
| 7  | Female | No     | Sun | Dinner | 4    | 24.59      | 3.61 |   |   |   |   |
| 8  | Male   | No     | Sun | Dinner | 4    | 25.29      | 4.71 |   |   |   |   |
| 9  | Male   | No     | Sun | Dinner | 2    | 8.77       | 2    |   |   |   |   |
| 10 | Male   | No     | Sun | Dinner | 4    | 26.88      | 3.12 |   |   |   |   |
| 11 | Male   | No     | Sun | Dinner | 2    | 15.04      | 1.96 |   |   |   |   |
| 12 | Male   | No     | Sun | Dinner | 2    | 14.78      | 3.23 |   |   |   |   |
| 13 | Male   | No     | Sun | Dinner | 2    | 10.27      | 1.71 |   |   |   |   |
| 14 | Female | No     | Sun | Dinner | 4    | 35.26      | 5    |   |   |   |   |
| 15 | Male   | No     | Sun | Dinner | 2    | 15.42      | 1.57 |   |   |   |   |
| 16 | Male   | No     | Sun | Dinner | 4    | 18.43      | 3    |   |   |   |   |
| 17 | Female | No     | Sun | Dinner | 2    | 14.83      | 3.02 |   |   |   |   |
| 18 | Male   | No     | Sun | Dinner | 2    | 21.58      | 3.92 |   |   |   |   |
| 19 | Female | No     | Sun | Dinner | 3    | 10.33      | 1.67 |   |   |   |   |
| 20 | Male   | No     | Sun | Dinner | 3    | 16.29      | 3.71 |   |   |   |   |
| 21 | Female | No     | Sun | Dinner | 3    | 16.97      | 3.5  |   |   |   |   |
| 22 | Male   | No     | Sat | Dinner | 3    | 20.65      | 3.35 |   |   |   |   |
| 23 | Male   | No     | Sat | Dinner | 2    | 17.92      | 4.08 |   |   |   |   |
| 24 | Female | No     | Sat | Dinner | 2    | 20.29      | 2.75 |   |   |   |   |

Go To Special

Select

- ☐ Comments
- ☐ Constants
- ☐ Formulas
  - ☒ Numbers
  - ☒ Text
  - ☒ Logicals
  - ☒ Errors
- ☒ Blanks
- ☐ Current region
- ☐ Current array
- ☐ Objects
- ☐ Row differences
- ☐ Column differences
- ☐ Precedents
- ☐ Dependents
  - ☐ Direct only
  - ☐ All levels
- ☐ Last cell
- ☐ Visible cells only
- ☐ Conditional formats
- ☐ Data validation
  - ☐ All
  - ☐ Same

OK Cancel

tips Data Encoding

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Sex

|    | A      | B      | C   | D      | E    | F          | G    | H | I | J | K |
|----|--------|--------|-----|--------|------|------------|------|---|---|---|---|
| 1  |        |        |     |        |      | Y          |      |   |   |   |   |
| 2  | Sex    | Smoker | Day | Time   | Size | Total_Bill | Tip  |   |   |   |   |
| 3  | Female | No     | Sun | Dinner | 2    | 16.99      | 1.01 |   |   |   |   |
| 4  | Male   | No     | Sun | Dinner | 3    | 10.34      | 1.66 |   |   |   |   |
| 5  | Male   | No     | Sun | Dinner | 3    | 21.01      | 3.5  |   |   |   |   |
| 6  | Male   | No     | Sun | Dinner | 2    | 23.68      | 3.31 |   |   |   |   |
| 7  | Female | No     | Sun | Dinner | 4    | 24.59      | 3.61 |   |   |   |   |
| 8  | Male   | No     | Sun | Dinner | 4    |            |      |   |   |   |   |
| 9  | Male   | No     | Sun | Dinner | 2    |            |      |   |   |   |   |
| 10 | Male   | No     | Sun | Dinner | 4    |            |      |   |   |   |   |
| 11 | Male   | No     | Sun | Dinner | 2    |            |      |   |   |   |   |
| 12 | Male   | No     | Sun | Dinner | 2    |            |      |   |   |   |   |
| 13 | Male   | No     | Sun | Dinner | 2    |            |      |   |   |   |   |
| 14 | Female | No     | Sun | Dinner | 4    | 35.26      | 5    |   |   |   |   |
| 15 | Male   | No     | Sun | Dinner | 2    | 15.42      | 1.57 |   |   |   |   |
| 16 | Male   | No     | Sun | Dinner | 4    | 18.43      | 3    |   |   |   |   |
| 17 | Female | No     | Sun | Dinner | 2    | 14.83      | 3.02 |   |   |   |   |
| 18 | Male   | No     | Sun | Dinner | 2    | 21.58      | 3.92 |   |   |   |   |
| 19 | Female | No     | Sun | Dinner | 3    | 10.33      | 1.67 |   |   |   |   |
| 20 | Male   | No     | Sun | Dinner | 3    | 16.29      | 3.71 |   |   |   |   |
| 21 | Female | No     | Sun | Dinner | 3    | 16.97      | 3.5  |   |   |   |   |
| 22 | Male   | No     | Sat | Dinner | 3    | 20.65      | 3.35 |   |   |   |   |
| 23 | Male   | No     | Sat | Dinner | 2    | 17.92      | 4.08 |   |   |   |   |
| 24 | Female | No     | Sat | Dinner | 2    | 20.29      | 2.75 |   |   |   |   |

Microsoft Excel

No cells were found.

OK

tips Data Encoding

2. Find the features that are independent and dependent

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get Data From Text/CSV Recent Sources From Web Existing Connections Queries & Connections Refresh All Properties Edit Links Sort Filter Reapply Advanced Text to Columns What-If Analysis Forecast Sheet Group Ungroup Subtotal Data Analysis Solver

Get & Transform Data Queries & Connections Sort & Filter Data Tools Forecast Outline Analyze

fx Sex

|    | A   | B      | C   | D    | E    | F          | G    | H | I | J | K | L | M | N | O | P | Q | R | S |
|----|-----|--------|-----|------|------|------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| 1  | Sex | Smoker | Day | Time | Size | Total_Bill | Tip  |   |   |   |   |   |   |   |   |   |   |   |   |
| 2  | 1   | 0      | 3   | 1    | 2    | 16.99      | 1.01 |   |   |   |   |   |   |   |   |   |   |   |   |
| 3  | 0   | 0      | 3   | 1    | 3    | 10.34      | 1.66 |   |   |   |   |   |   |   |   |   |   |   |   |
| 4  | 0   | 0      | 3   | 1    | 3    | 21.01      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 5  | 0   | 0      | 3   | 1    | 2    | 23.68      | 3.31 |   |   |   |   |   |   |   |   |   |   |   |   |
| 6  | 1   | 0      | 3   | 1    | 4    | 24.59      | 3.61 |   |   |   |   |   |   |   |   |   |   |   |   |
| 7  | 0   | 0      | 3   | 1    | 4    | 25.29      | 4.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 8  | 0   | 0      | 3   | 1    | 2    | 8.77       | 2    |   |   |   |   |   |   |   |   |   |   |   |   |
| 9  | 0   | 0      | 3   | 1    | 4    | 26.88      | 3.12 |   |   |   |   |   |   |   |   |   |   |   |   |
| 10 | 0   | 0      | 3   | 1    | 2    | 15.04      | 1.96 |   |   |   |   |   |   |   |   |   |   |   |   |
| 11 | 0   | 0      | 3   | 1    | 2    | 14.78      | 3.23 |   |   |   |   |   |   |   |   |   |   |   |   |
| 12 | 0   | 0      | 3   | 1    | 2    | 10.27      | 1.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13 | 1   | 0      | 3   | 1    | 4    | 35.26      | 5    |   |   |   |   |   |   |   |   |   |   |   |   |
| 14 | 0   | 0      | 3   | 1    | 2    | 15.42      | 1.57 |   |   |   |   |   |   |   |   |   |   |   |   |
| 15 | 0   | 0      | 3   | 1    | 4    | 18.43      | 3    |   |   |   |   |   |   |   |   |   |   |   |   |
| 16 | 1   | 0      | 3   | 1    | 2    | 14.83      | 3.02 |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 0   | 0      | 3   | 1    | 2    | 21.58      | 3.92 |   |   |   |   |   |   |   |   |   |   |   |   |
| 18 | 1   | 0      | 3   | 1    | 3    | 10.33      | 1.67 |   |   |   |   |   |   |   |   |   |   |   |   |
| 19 | 0   | 0      | 3   | 1    | 3    | 16.29      | 3.71 |   |   |   |   |   |   |   |   |   |   |   |   |

tips Data Encoding Covariance Correlation

Data Analysis

Analysis Tools

- Anova: Single Factor
- Anova: Two-Factor With Replication
- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram

OK Cancel Help

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get Data From Text/CSV Recent Sources From Web Existing Connections Queries & Connections Refresh All Properties Edit Links Sort Filter Reapply Advanced Text to Columns What-If Analysis Forecast Sheet Group Ungroup Subtotal Data Analysis Solver

Get & Transform Data Queries & Connections Sort & Filter Data Tools Forecast Outline Analyze

fx L16

|    | A   | B      | C   | D    | E    | F          | G    | H | I | J | K | L | M | N | O | P | Q | R | S |
|----|-----|--------|-----|------|------|------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| 1  | Sex | Smoker | Day | Time | Size | Total_Bill | Tip  |   |   |   |   |   |   |   |   |   |   |   |   |
| 2  | 1   | 0      | 3   | 1    | 2    | 16.99      | 1.01 |   |   |   |   |   |   |   |   |   |   |   |   |
| 3  | 0   | 0      | 3   | 1    | 3    | 10.34      | 1.66 |   |   |   |   |   |   |   |   |   |   |   |   |
| 4  | 0   | 0      | 3   | 1    | 3    | 21.01      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 5  | 0   | 0      | 3   | 1    | 2    | 23.68      | 3.31 |   |   |   |   |   |   |   |   |   |   |   |   |
| 6  | 1   | 0      | 3   | 1    | 4    | 24.59      | 3.61 |   |   |   |   |   |   |   |   |   |   |   |   |
| 7  | 0   | 0      | 3   | 1    | 4    | 25.29      | 4.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 8  | 0   | 0      | 3   | 1    | 2    | 8.77       | 2    |   |   |   |   |   |   |   |   |   |   |   |   |
| 9  | 0   | 0      | 3   | 1    | 4    | 26.88      | 3.12 |   |   |   |   |   |   |   |   |   |   |   |   |
| 10 | 0   | 0      | 3   | 1    | 2    | 15.04      | 1.96 |   |   |   |   |   |   |   |   |   |   |   |   |
| 11 | 0   | 0      | 3   | 1    | 2    | 14.78      | 3.23 |   |   |   |   |   |   |   |   |   |   |   |   |
| 12 | 0   | 0      | 3   | 1    | 2    | 10.27      | 1.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13 | 1   | 0      | 3   | 1    | 4    | 35.26      | 5    |   |   |   |   |   |   |   |   |   |   |   |   |
| 14 | 0   | 0      | 3   | 1    | 2    | 15.42      | 1.57 |   |   |   |   |   |   |   |   |   |   |   |   |
| 15 | 0   | 0      | 3   | 1    | 4    | 18.43      | 3    |   |   |   |   |   |   |   |   |   |   |   |   |
| 16 | 1   | 0      | 3   | 1    | 2    | 14.83      | 3.02 |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 0   | 0      | 3   | 1    | 2    | 21.58      | 3.92 |   |   |   |   |   |   |   |   |   |   |   |   |
| 18 | 1   | 0      | 3   | 1    | 3    | 10.33      | 1.67 |   |   |   |   |   |   |   |   |   |   |   |   |
| 19 | 0   | 0      | 3   | 1    | 3    | 16.29      | 3.71 |   |   |   |   |   |   |   |   |   |   |   |   |

|            | Sex      | Smoker   | Day      | Time     | Size     | Total_Bill | Tip      |
|------------|----------|----------|----------|----------|----------|------------|----------|
| Sex        | 0.229424 |          |          |          |          |            |          |
| Smoker     | -0.00066 | 0.235874 |          |          |          |            |          |
| Day        | -0.1275  | -0.01829 | 1.330338 |          |          |            |          |
| Time       | -0.04407 | 0.011959 | 0.452163 | 0.201021 |          |            |          |
| Size       | -0.03919 | -0.06139 | 0.181017 | 0.044007 | 0.900883 |            |          |
| Total_Bill | -0.6165  | 0.369866 | 1.779829 | 0.729402 | 5.045221 | 78.92813   |          |
| Tip        | -0.05877 | 0.003976 | 0.215798 | 0.075299 | 0.641267 | 8.289389   | 1.906609 |

tips Data Encoding Covariance Correlation

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get Data From Text/CSV Recent Sources From Web Existing Connections Queries & Connections Refresh All Properties Edit Links Sort Filter Reapply Advanced Text to Columns What-If Analysis Forecast Sheet Group Ungroup Subtotal Data Analysis Solver

Get & Transform Data Queries & Connections Sort & Filter Data Tools Forecast Outline Analyze

fx A1

|    | A   | B      | C   | D    | E    | F          | G    | H | I | J | K | L | M | N | O | P | Q | R | S |
|----|-----|--------|-----|------|------|------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| 1  | Sex | Smoker | Day | Time | Size | Total_Bill | Tip  |   |   |   |   |   |   |   |   |   |   |   |   |
| 2  | 1   | 0      | 3   | 1    | 2    | 16.99      | 1.01 |   |   |   |   |   |   |   |   |   |   |   |   |
| 3  | 0   | 0      | 3   | 1    | 3    | 10.34      | 1.66 |   |   |   |   |   |   |   |   |   |   |   |   |
| 4  | 0   | 0      | 3   | 1    | 3    | 21.01      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 5  | 0   | 0      | 3   | 1    | 2    | 23.68      | 3.31 |   |   |   |   |   |   |   |   |   |   |   |   |
| 6  | 1   | 0      | 3   | 1    | 4    | 24.59      | 3.61 |   |   |   |   |   |   |   |   |   |   |   |   |
| 7  | 0   | 0      | 3   | 1    | 4    | 25.29      | 4.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 8  | 0   | 0      | 3   | 1    | 2    | 8.77       | 2    |   |   |   |   |   |   |   |   |   |   |   |   |
| 9  | 0   | 0      | 3   | 1    | 4    | 26.88      | 3.12 |   |   |   |   |   |   |   |   |   |   |   |   |
| 10 | 0   | 0      | 3   | 1    | 2    | 15.04      | 1.96 |   |   |   |   |   |   |   |   |   |   |   |   |
| 11 | 0   | 0      | 3   | 1    | 2    | 14.78      | 3.23 |   |   |   |   |   |   |   |   |   |   |   |   |
| 12 | 0   | 0      | 3   | 1    | 2    | 10.27      | 1.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13 | 1   | 0      | 3   | 1    | 4    | 35.26      | 5    |   |   |   |   |   |   |   |   |   |   |   |   |
| 14 | 0   | 0      | 3   | 1    | 2    | 15.42      | 1.57 |   |   |   |   |   |   |   |   |   |   |   |   |
| 15 | 0   | 0      | 3   | 1    | 4    | 18.43      | 3    |   |   |   |   |   |   |   |   |   |   |   |   |
| 16 | 1   | 0      | 3   | 1    | 2    | 14.83      | 3.02 |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 0   | 0      | 3   | 1    | 2    | 21.58      | 3.92 |   |   |   |   |   |   |   |   |   |   |   |   |
| 18 | 1   | 0      | 3   | 1    | 3    | 10.33      | 1.67 |   |   |   |   |   |   |   |   |   |   |   |   |
| 19 | 0   | 0      | 3   | 1    | 3    | 16.29      | 3.71 |   |   |   |   |   |   |   |   |   |   |   |   |

tips Data Encoding Covariance Correlation

Data Analysis

Analysis Tools

- Anova: Single Factor
- Anova: Two-Factor With Replication
- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram

OK Cancel Help

|            | Sex      | Smoker   | Day      | Time     | Size     | Total_Bill | Tip |
|------------|----------|----------|----------|----------|----------|------------|-----|
| Sex        | 1        |          |          |          |          |            |     |
| Smoker     | 0.00153  | 1        |          |          |          |            |     |
| Day        | -0.22439 | -0.03771 | 1        |          |          |            |     |
| Time       | -0.20961 | 0.057046 | 0.882967 | 1        |          |            |     |
| Size       | -0.08325 | -0.13539 | 0.162525 | 0.105108 | 1        |            |     |
| Total_Bill | -0.14479 | 0.085466 | 0.173802 | 0.183558 | 0.598495 | 1          |     |
| Tip        | -0.0892  | 0.00594  | 0.136135 | 0.121723 | 0.489665 | 0.675753   | 1   |

Here,

Dependent Variable: Tips (Target Variable)

Independent variable: Sex, Smoker, Day, Time, Size, Total

3. Identify which predictive problem is needed.

The problem is a regression problem, where the goal is to predict the “tip” amount given the input values of the independent features. The numerical value “tip” is a continuous number as well.

4. Encode the categorical variables to numeric values using IF conditions

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Clipboard Font Alignment Number Styles Cells Editing

K19

|    | A   | B      | C   | D    | E    | F          | G    | H | I | J | K | L | M | N | O | P | Q | R | S |
|----|-----|--------|-----|------|------|------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| 2  | Sex | Smoker | Day | Time | Size | Total_Bill | Tip  |   |   |   |   |   |   |   |   |   |   |   |   |
| 3  | 1   | 0      | 3   | 1    | 2    | 16.99      | 1.01 |   |   |   |   |   |   |   |   |   |   |   |   |
| 4  | 0   | 0      | 3   | 1    | 3    | 10.34      | 1.66 |   |   |   |   |   |   |   |   |   |   |   |   |
| 5  | 0   | 0      | 3   | 1    | 3    | 21.01      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 6  | 0   | 0      | 3   | 1    | 2    | 23.68      | 3.31 |   |   |   |   |   |   |   |   |   |   |   |   |
| 7  | 1   | 0      | 3   | 1    | 4    | 24.59      | 3.61 |   |   |   |   |   |   |   |   |   |   |   |   |
| 8  | 0   | 0      | 3   | 1    | 4    | 25.29      | 4.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 9  | 0   | 0      | 3   | 1    | 2    | 8.77       | 2    |   |   |   |   |   |   |   |   |   |   |   |   |
| 10 | 0   | 0      | 3   | 1    | 4    | 26.88      | 3.12 |   |   |   |   |   |   |   |   |   |   |   |   |
| 11 | 0   | 0      | 3   | 1    | 2    | 15.04      | 1.96 |   |   |   |   |   |   |   |   |   |   |   |   |
| 12 | 0   | 0      | 3   | 1    | 2    | 14.78      | 3.23 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13 | 0   | 0      | 3   | 1    | 2    | 10.27      | 1.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 14 | 1   | 0      | 3   | 1    | 4    | 35.26      | 5    |   |   |   |   |   |   |   |   |   |   |   |   |
| 15 | 0   | 0      | 3   | 1    | 2    | 15.42      | 1.57 |   |   |   |   |   |   |   |   |   |   |   |   |
| 16 | 0   | 0      | 3   | 1    | 4    | 18.43      | 3    |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 1   | 0      | 3   | 1    | 2    | 14.83      | 3.02 |   |   |   |   |   |   |   |   |   |   |   |   |
| 18 | 0   | 0      | 3   | 1    | 2    | 21.58      | 3.92 |   |   |   |   |   |   |   |   |   |   |   |   |
| 19 | 1   | 0      | 3   | 1    | 3    | 10.33      | 1.67 |   |   |   |   |   |   |   |   |   |   |   |   |
| 20 | 0   | 0      | 3   | 1    | 3    | 16.29      | 3.71 |   |   |   |   |   |   |   |   |   |   |   |   |

tips Data Encoding Sheet1

With the help of tips given:

Sex:  
=IF(tips!A3="Female",1,0)

Smoker:  
=IF(tips!B3="No",0,1)

Day:  
=IF(tips!C3="Thur",0,IF(tips!C3="Fri",1,IF(tips!C3="Sat",2,3)))

Time:  
=IF(tips!D3="Dinner",1,0)

5. Build an appropriate model with the dataset.

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get & Transform Data Queries & Connections Sort & Filter Data Tools Forecast Outline Analyze

GET GENUINE OFFICE Your license isn't genuine, and you may be a victim of software counterfeiting. Avoid interruption and keep your files safe with genuine Office today. Get genuine Office Learn more

W9

|    | A   | B      | C   | D    | E    | F          | G    | H | I | J | K | L | M | N | O | P | Q | R | S |
|----|-----|--------|-----|------|------|------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| 2  | Sex | Smoker | Day | Time | Size | Total_Bill | Tip  |   |   |   |   |   |   |   |   |   |   |   |   |
| 3  | 1   | 0      | 3   | 1    | 2    | 16.99      | 1.01 |   |   |   |   |   |   |   |   |   |   |   |   |
| 4  | 0   | 0      | 3   | 1    | 3    | 10.34      | 1.66 |   |   |   |   |   |   |   |   |   |   |   |   |
| 5  | 0   | 0      | 3   | 1    | 3    | 21.01      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 6  | 0   | 0      | 3   | 1    | 2    | 23.68      | 3.31 |   |   |   |   |   |   |   |   |   |   |   |   |
| 7  | 1   | 0      | 3   | 1    | 4    | 24.59      | 3.61 |   |   |   |   |   |   |   |   |   |   |   |   |
| 8  | 0   | 0      | 3   | 1    | 4    | 25.29      | 4.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 9  | 0   | 0      | 3   | 1    | 2    | 8.77       | 2    |   |   |   |   |   |   |   |   |   |   |   |   |
| 10 | 0   | 0      | 3   | 1    | 4    | 26.88      | 3.12 |   |   |   |   |   |   |   |   |   |   |   |   |
| 11 | 0   | 0      | 3   | 1    | 2    | 15.04      | 1.96 |   |   |   |   |   |   |   |   |   |   |   |   |
| 12 | 0   | 0      | 3   | 1    | 2    | 14.78      | 3.23 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13 | 0   | 0      | 3   | 1    | 2    | 10.27      | 1.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 14 | 1   | 0      | 3   | 1    | 4    | 35.26      | 5    |   |   |   |   |   |   |   |   |   |   |   |   |
| 15 | 0   | 0      | 3   | 1    | 2    | 15.42      | 1.57 |   |   |   |   |   |   |   |   |   |   |   |   |
| 16 | 0   | 0      | 3   | 1    | 4    | 18.43      | 3    |   |   |   |   |   |   |   |   |   |   |   |   |
| 17 | 1   | 0      | 3   | 1    | 2    | 14.83      | 3.02 |   |   |   |   |   |   |   |   |   |   |   |   |
| 18 | 0   | 0      | 3   | 1    | 2    | 21.58      | 3.92 |   |   |   |   |   |   |   |   |   |   |   |   |
| 19 | 1   | 0      | 3   | 1    | 3    | 10.33      | 1.67 |   |   |   |   |   |   |   |   |   |   |   |   |
| 20 | 0   | 0      | 3   | 1    | 3    | 16.29      | 3.71 |   |   |   |   |   |   |   |   |   |   |   |   |
| 21 | 1   | 0      | 3   | 1    | 3    | 16.97      | 3.5  |   |   |   |   |   |   |   |   |   |   |   |   |
| 22 | 0   | 0      | 2   | 1    | 3    | 20.65      | 3.35 |   |   |   |   |   |   |   |   |   |   |   |   |
| 23 | 0   | 0      | 2   | 1    | 2    | 17.92      | 4.08 |   |   |   |   |   |   |   |   |   |   |   |   |

tips Data Encoding Covariance Correlation Regression RMSE

Data Analysis

Analysis Tools

- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation
- Rank and Percentile
- Regression
- Sampling

OK Cancel Help

|           | Coefficients | Standard Error | t Stat       | P-value     | Lower 95%    | Upper 95%   | Lower 95.0%  | Upper 95.0% |
|-----------|--------------|----------------|--------------|-------------|--------------|-------------|--------------|-------------|
| Intercept | 0.996029883  | 0.278626627    | 3.574783557  | 0.000424683 | 0.447128739  | 1.544931027 | 0.447128739  | 1.544931027 |
| Sex       | -0.105239005 | 0.167238487    | -0.629275038 | 0.529775108 | -0.434702839 | 0.224224829 | -0.434702839 | 0.224224829 |
| Smoker    | 0.195393654  | 0.164390078    | 1.188597606  | 0.235787676 | -0.128458748 | 0.519246055 | -0.128458748 | 0.519246055 |
| Day       | -0.004865717 | 0.148303964    | -0.032809082 | 0.97385445  | -0.297028087 | 0.287296653 | -0.297028087 | 0.287296653 |
| Time      | 0.191858733  | 0.377036565    | 0.508859752  | 0.611323924 | -0.550912353 | 0.934629819 | -0.550912353 | 0.934629819 |
| Size      | 0.713434995  | 0.083947912    | 8.498543653  | 2.15887E-15 | 0.548055592  | 0.878814397 | 0.548055592  | 0.878814397 |



File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get Data From Text/CSV Recent Sources From Web Existing Connections Refresh All Properties Edit Links

Queries & Connections

Sort & Filter Filter Clear Reapply Advanced

Data Tools Text to Columns What-If Analysis Forecast Sheet

Group Ungroup Subtotal

Data Analysis Solver

GET GENUINE OFFICE Your license isn't genuine, and you may be a victim of software counterfeiting. Avoid interruption and keep your files safe with genuine Office today. Get genuine Office Learn more

13 Sex

| Sex | Smoker | Day | Time | Size | Total_Bill |       |
|-----|--------|-----|------|------|------------|-------|
| 1   | 1      | 0   | 3    | 1    | 2          | 16.99 |
| 2   | 0      | 0   | 3    | 1    | 3          | 10.34 |
| 3   | 0      | 0   | 3    | 1    | 3          | 21.01 |
| 4   | 0      | 0   | 3    | 1    | 2          | 23.68 |
| 5   | 1      | 0   | 3    | 1    | 4          | 24.59 |
| 6   | 0      | 0   | 3    | 1    | 4          | 25.29 |
| 7   | 0      | 0   | 3    | 1    | 2          | 8.77  |
| 8   | 0      | 0   | 3    | 1    | 4          | 26.88 |
| 9   | 0      | 0   | 3    | 1    | 2          | 15.04 |
| 10  | 0      | 0   | 3    | 1    | 2          | 14.78 |
| 11  | 0      | 0   | 3    | 1    | 2          | 10.27 |
| 12  | 1      | 0   | 3    | 1    | 4          | 35.26 |
| 13  | 0      | 0   | 3    | 1    | 2          | 15.42 |
| 14  | 0      | 0   | 3    | 1    | 4          | 18.43 |
| 15  | 1      | 0   | 3    | 1    | 2          | 14.83 |
| 16  | 0      | 0   | 3    | 1    | 4          | 21.50 |
| 17  | 0      | 0   | 3    | 1    | 2          | 2.07  |

Regression

Input Y Range: \$G\$2:\$G\$245

Input X Range: \$A\$2:\$F\$245

☒ Labels ☐ Constant is Zero

☒ Confidence Level: 95 %

Output options

☒ Output Range: \$I\$3

☐ New Worksheet Ply:

☐ New Workbook

Residuals

☐ Residuals ☐ Residual Plots

☐ Standardized Residuals ☐ Line Fit Plots

Normal Probability

☐ Normal Probability Plots

tips Data Encoding Covariance Correlation Multiple Linear Regression Regression RMSE ...

File Home NITIKA Insert Draw Page Layout Formulas Data Review View Developer Help Tell me what you want to do

Get Data From Text/CSV Recent Sources From Web Existing Connections Refresh All Properties Edit Links

Queries & Connections

Sort & Filter Filter Clear Reapply Advanced

Data Tools Text to Columns What-If Analysis Forecast Sheet

Group Ungroup Subtotal

Data Analysis Solver

GET GENUINE OFFICE Your license isn't genuine, and you may be a victim of software counterfeiting. Avoid interruption and keep your files safe with genuine Office today. Get genuine Office Learn more

R9

| Sex | Smoker | Day | Time | Size | Total_Bill | Tip   |      |
|-----|--------|-----|------|------|------------|-------|------|
| 1   | 1      | 0   | 3    | 1    | 2          | 16.99 | 1.01 |
| 2   | 0      | 0   | 3    | 1    | 3          | 10.34 | 1.66 |
| 3   | 0      | 0   | 3    | 1    | 3          | 21.01 | 3.5  |
| 4   | 0      | 0   | 3    | 1    | 2          | 23.68 | 3.31 |
| 5   | 1      | 0   | 3    | 1    | 4          | 24.59 | 3.61 |
| 6   | 0      | 0   | 3    | 1    | 4          | 25.29 | 4.71 |
| 7   | 0      | 0   | 3    | 1    | 2          | 8.77  | 2    |
| 8   | 0      | 0   | 3    | 1    | 4          | 26.88 | 3.12 |
| 9   | 0      | 0   | 3    | 1    | 2          | 15.04 | 1.96 |
| 10  | 0      | 0   | 3    | 1    | 2          | 14.78 | 3.23 |
| 11  | 0      | 0   | 3    | 1    | 2          | 10.27 | 1.71 |
| 12  | 1      | 0   | 3    | 1    | 4          | 35.26 | 5    |
| 13  | 0      | 0   | 3    | 1    | 2          | 15.42 | 1.57 |
| 14  | 0      | 0   | 3    | 1    | 4          | 18.43 | 3    |
| 15  | 1      | 0   | 3    | 1    | 2          | 14.83 | 3.02 |
| 16  | 0      | 0   | 3    | 1    | 4          | 21.50 | 3.02 |
| 17  | 0      | 0   | 3    | 1    | 2          | 2.07  | 1.01 |

SUMMARY OUTPUT

Regression Statistics

Multiple R 0.685104429

R Square 0.469388079

Adjusted R Square 0.435877817

Standard Error 1.022742634

Observations 243

ANOVA

|            | df  | SS          | MS          | F           | Significance F |
|------------|-----|-------------|-------------|-------------|----------------|
| Regression | 6   | 218.3558852 | 36.39264753 | 34.79212306 | 5.177676E-30   |
| Residual   | 236 | 246.8565889 | 1.046002495 |             |                |
| Total      | 242 | 465.2124741 |             |             |                |

Coefficients Standard Error t Stat P-value Lower 95% Upper 95% Lower 95.0% Upper 95.0%

Intercept 0.686158934 0.23792279 2.901344926 0.004041921 0.221208172 1.155109606 0.221208172 1.155109606

Sex 0.031899027 0.341711534 0.225098309 0.822097585 -0.247282169 0.311080223 -0.247282169 0.311080223

Smoker -0.071615665 0.141244371 -0.507033766 0.612604557 -0.349876518 0.206645188 -0.349876518 0.206645188

Day 0.062044382 0.125244659 0.495385448 0.620789009 -0.18469597 0.308784733 -0.18469597 0.308784733

Time -0.135849702 0.119676276 -0.424960225 0.671252866 -0.765833317 0.493933933 -0.765833317 0.493933933

Size 0.175283491 0.089377965 1.961155403 0.051036869 -0.000796485 0.351363466 -0.000796485 0.351363466

Total\_Bill 0.094276585 0.009558468 9.80314792 1.94966E-19 0.075445764 0.113107407 0.075445764 0.113107407

tips Data Encoding Covariance Correlation Multiple Linear Regression Regression RMSE ...