

**ANL201**

**Data Visualization For Business**

**JAN 2024**

**ECA**

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| T-Group | T07 |
| Date Submitted | 27 March 2024 Wednesday |

**Answer all questions. (Total 100 marks)**

**Question 1 (20 marks)**

**ANS:**

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| --- | --- | --- | --- | --- |
| **S/N** | **Variable** | **Data Type** | **Number of Observations** | **Summary Statistics** |
| 1 | Vehicle Identification Number | Nominal | 6628 values  5 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: 5UXTA6C06P  Minimum: Not Applicable  Maximum: Not Applicable |
| 2 | City | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: Vancouver  Minimum: Not Applicable  Maximum: Not Applicable |
| 3 | State | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: WA  Minimum: Not Applicable  Maximum: Not Applicable |
| 4 | Postal Code | Nominal | 6633 values  0 missing values | Mean: 98094.7575757576  (Round Off 3 Decimal Place: 98094.758)  Median: 98052  Mode: 98052  Minimum: -98682  Maximum: 98686 |
| 5 | Legislative District | Ordinal | 6633 values  0 missing values | Mean: 32.0073270013569  (Round Off 3 Decimal Place: 32.007)  Median: 41  Mode: 48  Minimum: 1  Maximum: 49 |
| 6 | Model Year | Interval | 6633 values  0 missing values | Mean: 2021.74566561134 (Round Off 3 Decimal Place: 2021.746)  Median: 2022  Mode: 2023  Minimum: 2019  Maximum: 2023 |
| 7 | Make | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: BMW  Minimum: Not Applicable  Maximum: Not Applicable |
| 8 | Model | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: LEAF  Minimum: Not Applicable  Maximum: Not Applicable |
| 9 | Electric Vehicle Type | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: Battery Electric Vehicle (BEV)  Minimum: Not Applicable  Maximum: Not Applicable |
| 10 | Clean Alternative Fuel Vehicle (CAFV) Eligibility | Nominal | 6633 values  0 missing values | Mean: Not Applicable  Median: Not Applicable  Mode: Eligibility unknown as battery range has not been researched  Minimum: Not Applicable  Maximum: Not Applicable |
| 11 | Electric Range | Ratio | 6633 values  0 missing values | Mean: 37.4509271822705  (Round Off 3 Decimal Place: 37.451)  Median: 0  Mode: 0  Minimum: 0  Maximum: 800 |

**Question 2 (30 marks)**

**ANS: Word Count: 250 Words (Excluding Figure Headers & Chart Titles)**

**Issue 1: Blanks In Vehicle Identification Number**

I filtered the values in ascending order and there were 5 blanks. When I used a Pivot Table, the name of the Pivot Table and grand total was incorrect.

1st treatment involved dropping the 5 rows with blanks.

2nd treatment involved replacing the blanks with the most occurring value.

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| **Treatment 1:** | |
| **Before:** | A screenshot of a computer  Description automatically generated  Figure 2.1 Missing Values Highlighted In Light Red  A screenshot of a spreadsheet  Description automatically generated  A screenshot of a spreadsheet  Description automatically generated  Figure 2.2 Faulty Pivot Table As A Result Of Missing Values |
| **After:** | **A table with black text  Description automatically generated**  Figure 2.3 Treated Data By Removing Rows Highlighted In Light Red  **A screenshot of a computer  Description automatically generated**  **A screenshot of a spreadsheet  Description automatically generated**  Figure 2.4 Fixed Pivot Data |
| **Treatment 2:** | |
| Before | A screenshot of a computer  Description automatically generated  Figure 2.5 Missing Values Highlighted In Light Red  A screenshot of a spreadsheet  Description automatically generated  A screenshot of a spreadsheet  Description automatically generated  Figure 2.6 Faulty Pivot Table As A Result Of Missing Values |
| After | A screenshot of a computer  Description automatically generated  Figure 2.7 Treated Data With New Values  A screenshot of a computer  Description automatically generated  A white grid with blue lines  Description automatically generated with medium confidence  Figure 2.8 Fixed Pivot Table With Updated Value For Vehicle Identification Number Column |

**Issue 2: Inconsistent Negative Values In Postal Code**

There were inconsistent negative values compared to the rest of the values.

The 1st treatment involved removing the negative signs in the 2 values.

The 2nd treatment involved the replacing the negative values with 98004 which was the subsequent values.

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| **Treatment 1:** | |
| **Before:** | A screenshot of a computer  Description automatically generated  Figure 2.9 Inconsistent Negative Values |
| **After:** | A screenshot of a computer  Description automatically generated  Figure 2.10 Treated Data By Removing Negative Sign |
| **Treatment 2:** | |
| **Before** | A screenshot of a computer  Description automatically generated  Figure 2.11 Inconsistent Negative Values |
| **After** | **A screenshot of a computer  Description automatically generated**  Figure 2.12 Treated Data By Replacing Negative Values With New Values  **A screenshot of a table  Description automatically generated**  **A screenshot of a computer  Description automatically generated**  Figure 2.13 Updated Pivot Table For Postal Code Column |

**Issue 3: Inconsistent Decimal Values In Legislative District Column**

There were 1.2 and 41.4 which were decimal values and were inconsistent with the rest of the values.

The treatment was to either round up the decimal point if 0.5 and above or round down if 0.4 and below.

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| **Treatment 1:** | |
| **Before** | A screenshot of a table  Description automatically generatedA screenshot of a spreadsheet  Description automatically generatedA screenshot of a spreadsheet  Description automatically generated  Figure 2.14 Inconsistent Decimal Values |
| **After** | **A screenshot of a table  Description automatically generated A screenshot of a spreadsheet  Description automatically generated**  Figure 2.15 Treated Data By Removing Decimal Values |

**Issue 4: Misspelled Value In City**

After filtering the names in ascending order, there were 2 values named Redmon which was not a city but a town in the United States. The treatment was to correct the spelling from Redmon to Redmond.

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| **Treatment 1:** | |
| Before | A table with black text  Description automatically generated A screenshot of a computer  Description automatically generated  Figure 2.16 Incorrect Named Value Highlighted In Yellow |
| After | A screenshot of a computer  Description automatically generated  Figure 2.17 Treated Data By Correcting Spelling Of City Name |

**Issue 5: Outlier In Electric Range**

I used the values to generate a box plot which displayed outliers.

The 1st treatment removed the outliers. I used the treated data to generate a box plot which showed no outliers.

The 2nd treatment involved replacing outliers with the upper whisker value 37 rounded to the nearest whole number.

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| **Treatment 1:** | |
| **Before** | A screenshot of a graph  Description automatically generated  Figure 2.18 Box and Whisker Plot for Electric Range Column With Outliers  A screenshot of a calculator  Description automatically generated  Figure 2.19 Electric Range Column Pivot Table With Outliers |
| **After** | A screenshot of a graph  Description automatically generated  Figure 2.20 Updated Box and Whisker Plot for Electric Range Column |
| **Treatment 2:** | |
| **Before** | A screenshot of a graph  Description automatically generated  Figure 2.21 Box and Whisker Plot for Electric Range Column With Outliers |
| **After** | A screenshot of a spreadsheet  Description automatically generated  Figure 2.21 Box and Whisker Plot for Electric Range Column Without Outliers |

**Question 3 (25 marks)**

**ANS: Word Count: 296 (Excluding Chart Titles)**

**Chart 1: Stacked Bar Chart of the average electric range based on car maker and EV type**

**A screenshot of a graph

Description automatically generated**

The individual average electric range of PHEV’s manufactured by KIA, Chevrolet, Hyundai and Ford are higher than the average electric range of 31.24.

Chevrolet PHEV’s have the longest average electric range at 53, meanwhile, Volvo PHEV’s have the shortest at 25.80.

Nissan BEV’s have the longest average electric range at 15.30, meanwhile, BMW BEV’s have the shortest at 1.52.

This mean that for each car maker, PHEV’s have a longer electric range compared to BEV’s.

**Chart 2: Pie Charts of Clean Alternative Fuel Vehicle (CAFV) eligibility by city and EV type**

**A screenshot of a graph

Description automatically generated**

**A colorful pie chart with numbers

Description automatically generated**

**A pie chart with different colored circles

Description automatically generated**

In the 1st Pie Chart, Bellevue has the highest number of CAFV Eligible Electric Vehicles (EVs) at 363 while Renton has the lowest number at 216.

In the 2nd Pie Chart, Vancouver has the highest number of unknown CAFV Eligible EVs because of unknown battery range at 759 while Sammamish has the lowest number at 415.

In the 3rd Pie Chart, Bellevue has the highest number of ineligible CAFV EVs due to low battery range at 131 while the Bothell has the lowest number at 63.

**Chart 3: Tree Map of average electric range based on car model**

**A screenshot of a chart

Description automatically generated**

The car maker Chevrolet offers the model VOLT that has the longest average electric range at 53 followed by the Volvo model V60 with 36 and the Ford model ESCAPE with 38.

The car maker BMW offers the model 745E that has the shortest average electric range at 16.

The model with the highest average electric range has the largest square while the model with the lowest average electric range has the smallest square.

**Chart 4: Tree Map of the number of postal codes per legislative district**

A screenshot of a computer screen

Description automatically generated

The district with the highest postal codes number has the largest square while the district with the lowest number had the smallest square.

By filtering for the number of postal codes between 502 and 1332, all districts are located in WA and district 48 has the largest postal code number at 1332. Meanwhile, district 17 has the lowest number with 502.

**Question 4 (25 marks)**

**ANS: Word Count: 298 Words**

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Description automatically generated

For the business performance dashboard, it abides by the dashboard design principles because of several reasons. The 1st reason is it abides by the principle of keeping it simple. For example, in the stacked bar chart, see how the car makers have an impact on the average electric range of EVs.

The 2nd reason is it abides by the principle of not displaying everything. For example, in the tree map in the bottom left hand corner, it only shows the car maker, model and the average electric range which is important for stakeholders who are looking to purchase an EV.

The 3rd reason is it abides by the principle of keeping to a single page. For example in the Tree Map on the bottom left hand corner, which shows the total number of postal codes for each legislative district, it is filtered to show the 4 districts with the highest number of postal codes which is important to stakeholders who do not want to see the other districts their postal codes.

**Action 1: Navigate to External Link (URL Action)**

**Implementation:**

**1. Select Dashboard 🡪 Action:** A screenshot of a computer

Description automatically generated

**2. Select ‘This sheet’ to show actions for a sheet:**

A screenshot of a computer

Description automatically generated

**3. Click Add Action 🡪 Go to URL:**

A screenshot of a computer

Description automatically generated

**4. Edit URL Action, click ‘OK’:**

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Description automatically generated

**5. URL Action is added, click ‘OK’:**

A screenshot of a computer

Description automatically generated

**6. Right click on a chart, in the menu is the hyperlink ‘Alternative Fuel Vehicle (AFV) Grants’, click it:**

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Description automatically generated

**Action 2: Filtering Data (Selection Action)**

**Implementation:**

**1. Select Dashboard 🡪 Action:**

A screenshot of a computer

Description automatically generated

**2. Click Add Action 🡪 Filter ..:**

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Description automatically generated

**3. Create filter by applying the changes below, click ‘OK’:**

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Description automatically generated

**4. Filter Action has been added, click ‘OK’:**

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Description automatically generated

**5. Click on Stacked Bar Average Electric Range ‘53.0’ in the Stacked Bar Chart, notice the filtered data in the bottom left hand corner Tree Map:A screenshot of a computer

Description automatically generated**

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