ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

Project description:

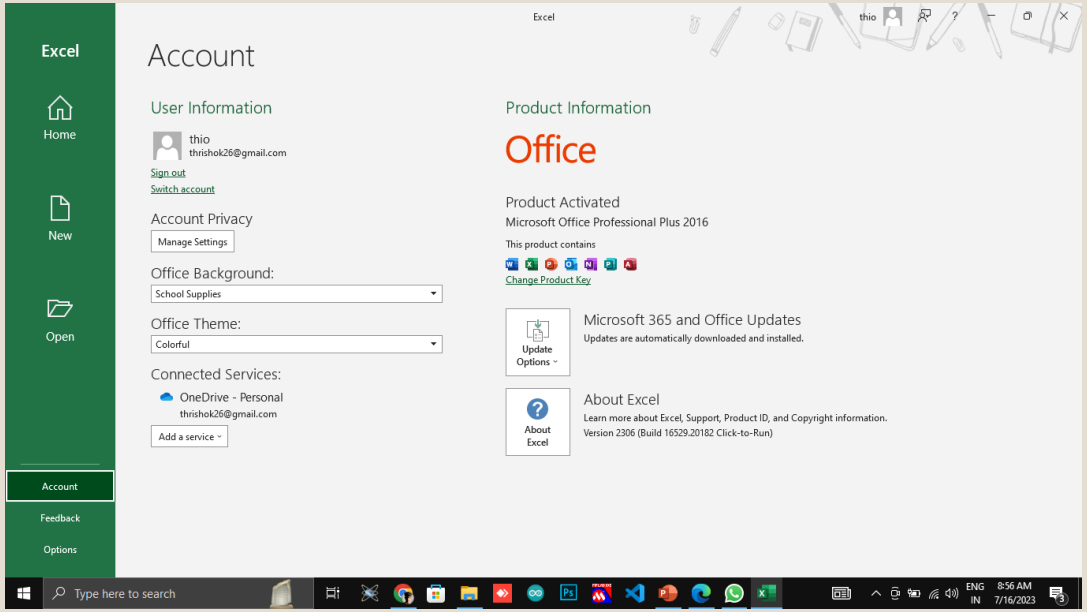
- The automotive industry has been rapidly evolving over the past few decades, with a growing focus on fuel efficiency, environmental sustainability, and technological innovation. With increasing competition among manufacturers and a changing consumer landscape, it has become more important than ever to understand the factors that drive consumer demand for cars.
- In recent years, there has been a growing trend towards electric and hybrid vehicles and increased interest in alternative fuel sources such as hydrogen and natural gas.
- At the same time, traditional gasoline-powered cars remain dominant in the market, with varying fuel types and grades available to consumers.

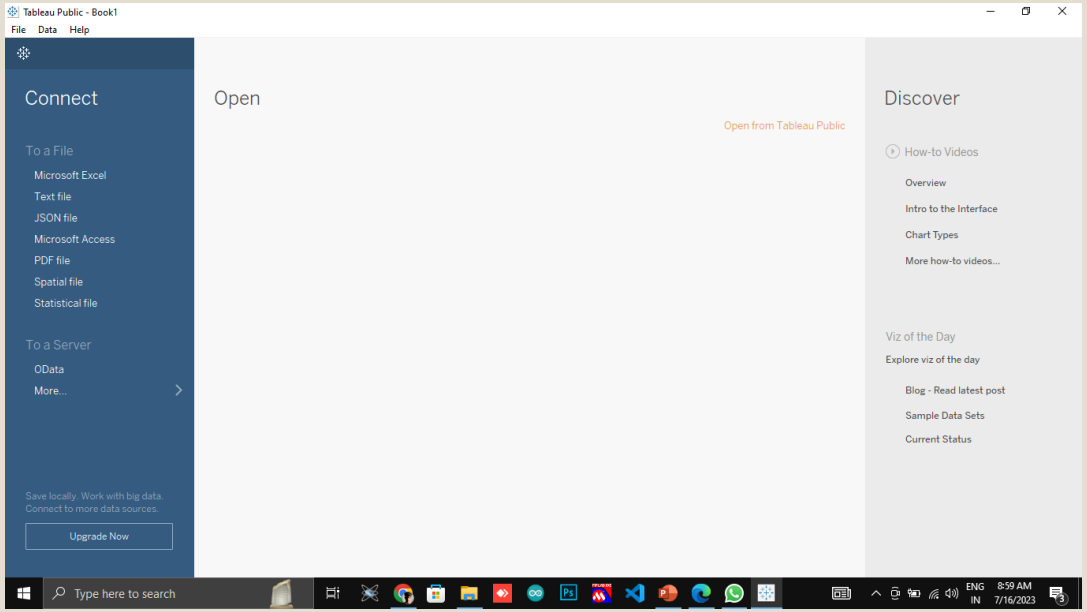
Approach:

- This problem could be approached by analyzing the relationship between a car's features, market category, and pricing, and identifying which features and categories are most popular among consumers and most profitable for the manufacturer.
- By using data analysis techniques such as regression analysis and market segmentation, the manufacturer could develop a pricing strategy that balances consumer demand with profitability, and identify which product features to focus on in future product development efforts.
- This could help the manufacturer improve its competitiveness in the market and increase its profitability over time.

TECH-STACK USED:

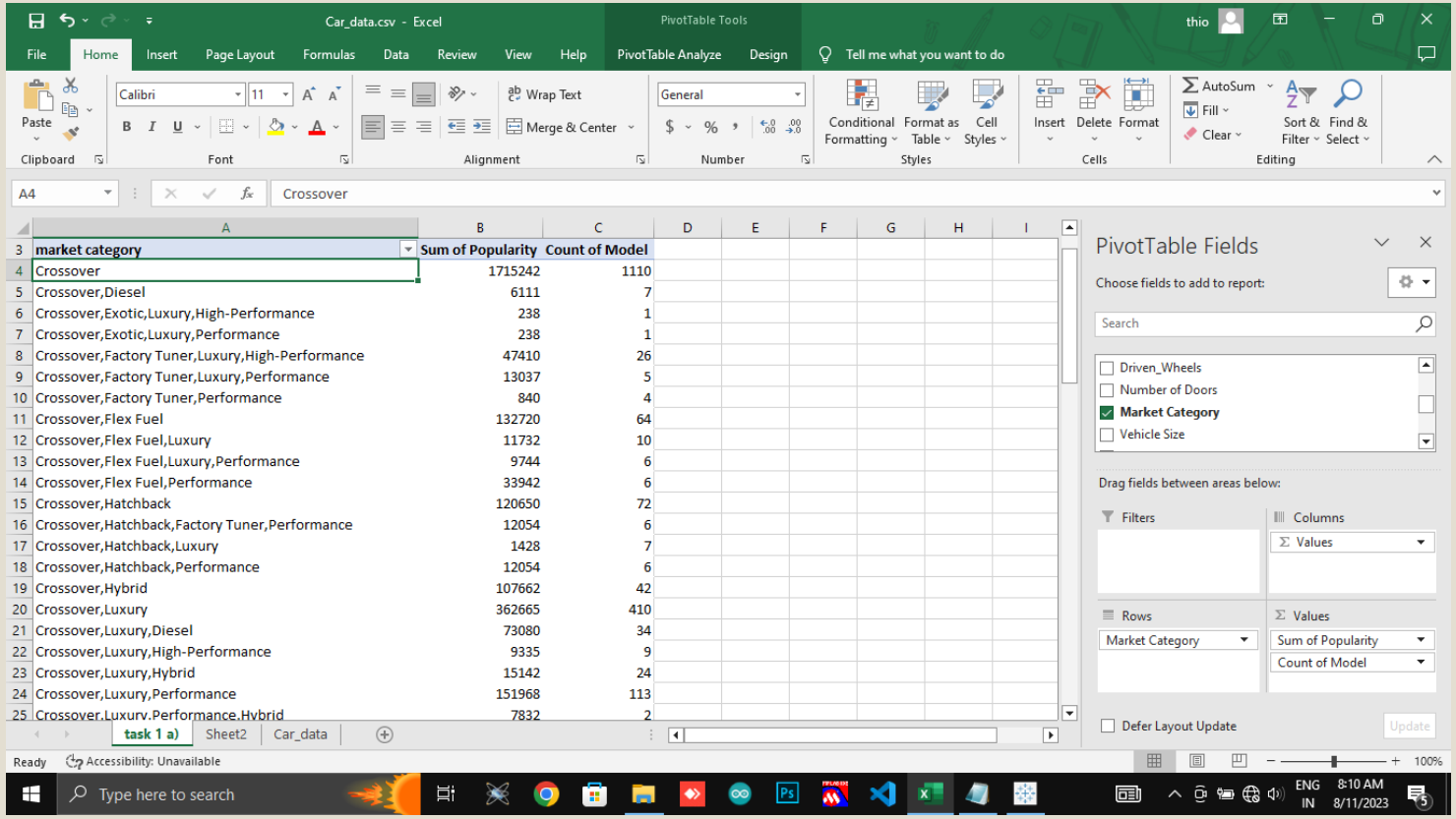
- For this project I have used MS Excel and Tableau.





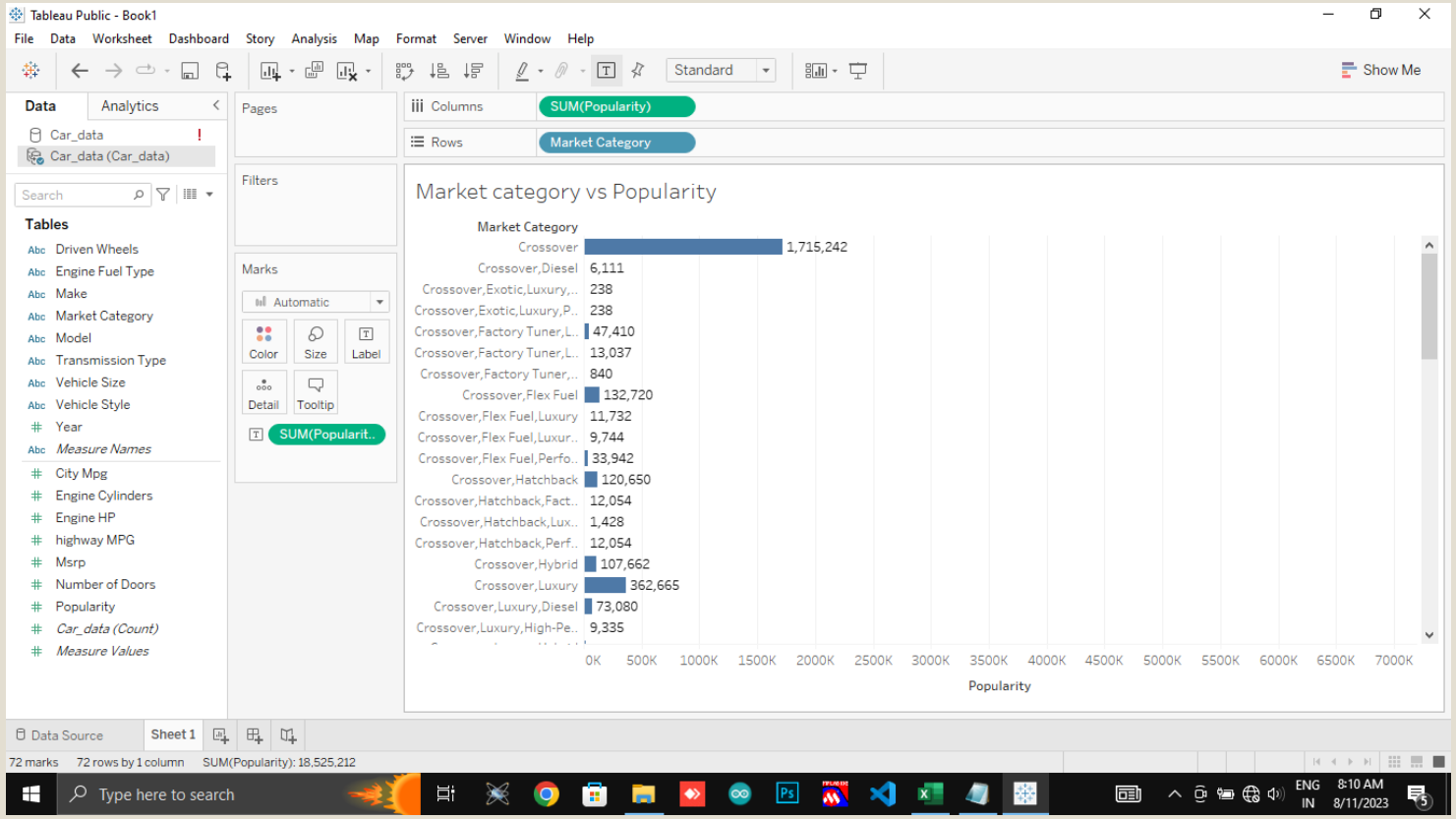
Task 1 a:

Pivot table that shows the number of car models in each market category and their corresponding popularity scores.



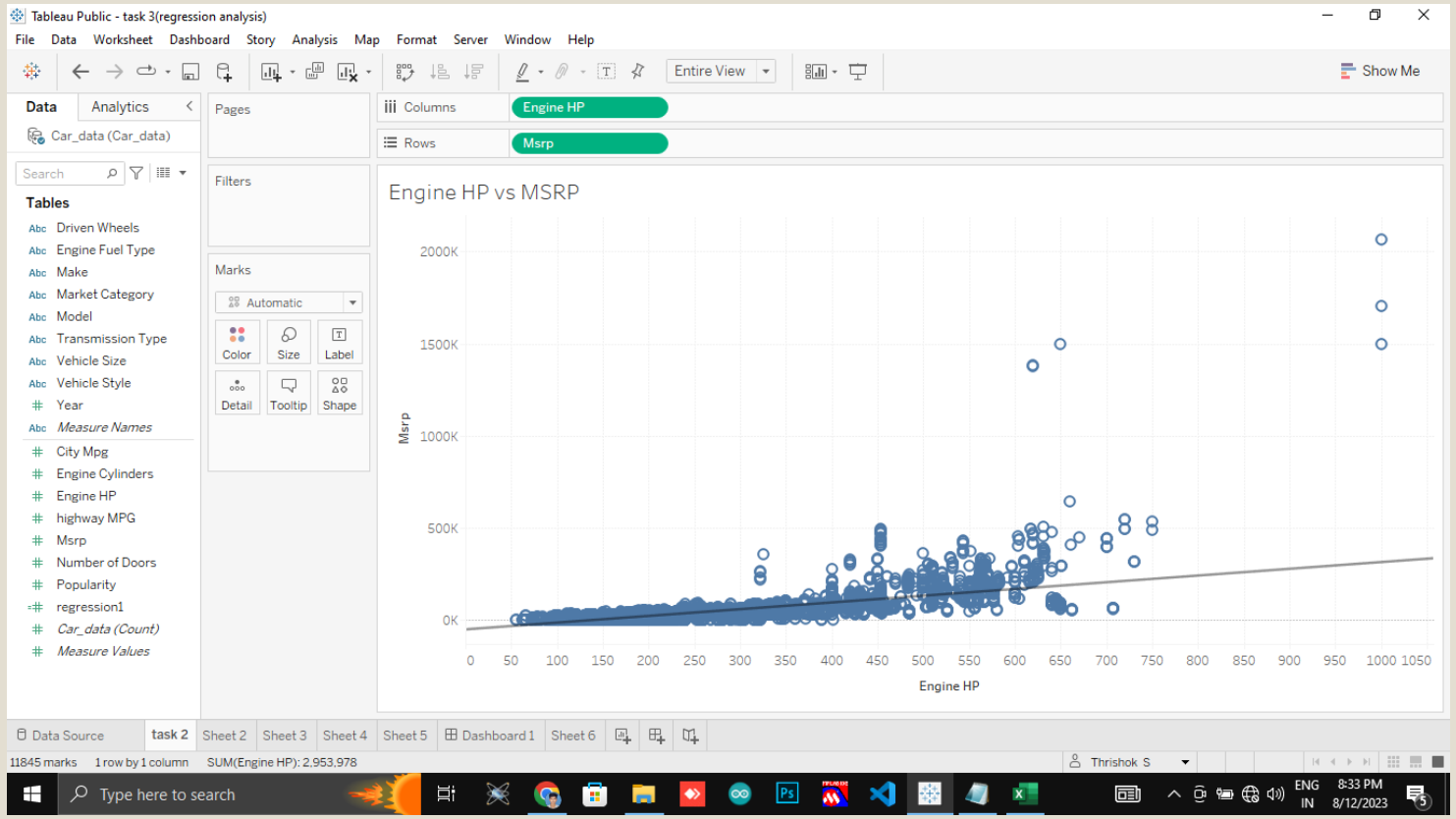
Task 1 b:

Combo chart that visualizes the relationship between market category and popularity.



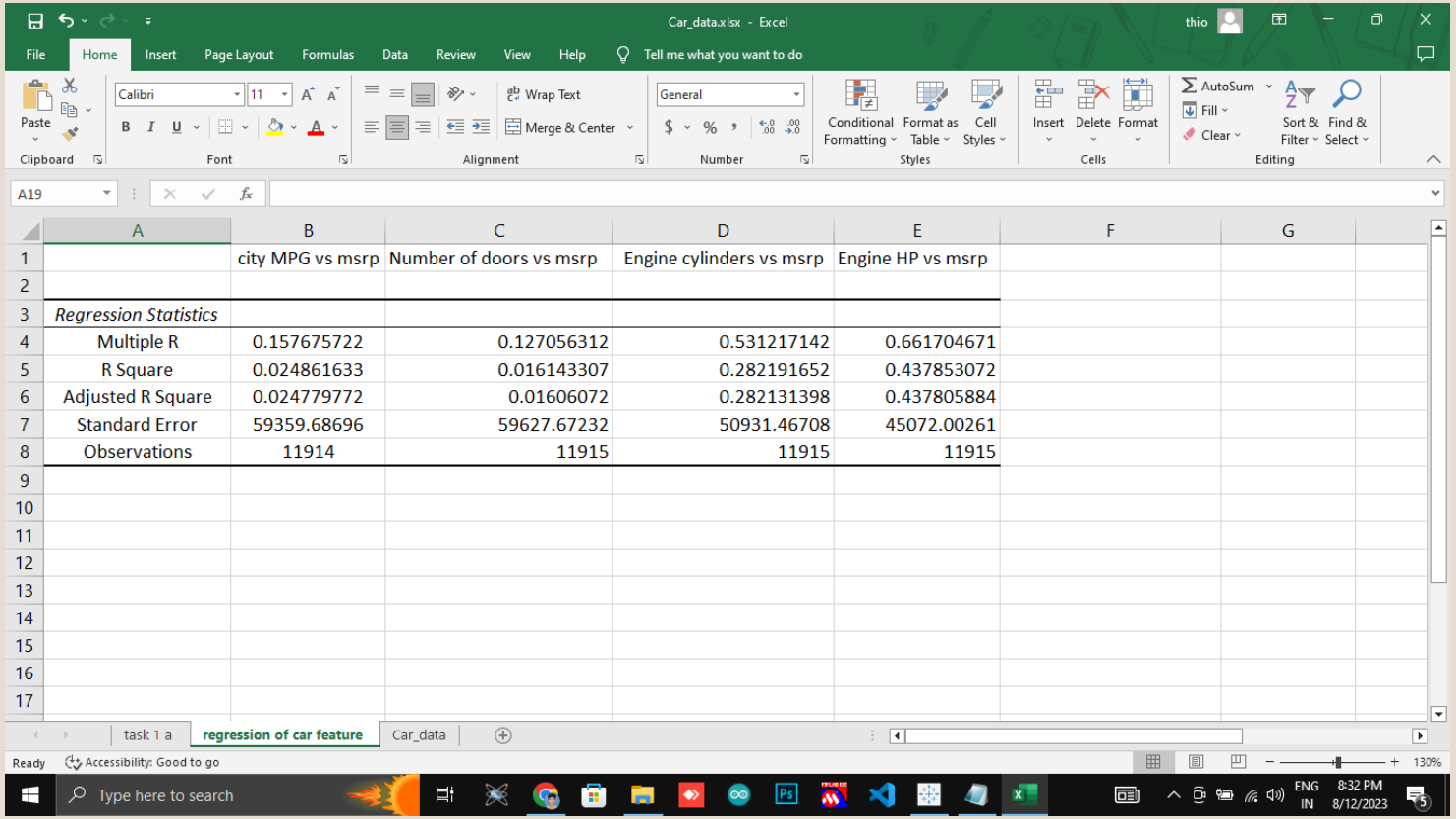
Task 2:

Scatter chart that plots engine power on the x-axis and price on the y-axis.A trendline is added to the chart to visualize the relationship between these variables.



Task 3:

Regression analysis to identify the variables that have the strongest relationship with a car's price. Then a bar chart is created that shows the "R" values for each variable to visualize their relative importance.



	A	B	C	D	E	F	G
1		city MPG vs msrp	Number of doors vs msrp	Engine cylinders vs msrp	Engine HP vs msrp		
2							
3	*Regression Statistics*						
4	Multiple R	0.157675722	0.127056312	0.531217142	0.661704671		
5	R Square	0.024861633	0.016143307	0.282191652	0.437853072		
6	Adjusted R Square	0.024779772	0.01606072	0.282131398	0.437805884		
7	Standard Error	59359.68696	59627.67232	50931.46708	45072.00261		
8	Observations	11914	11915	11915	11915		
9							
10							
11							
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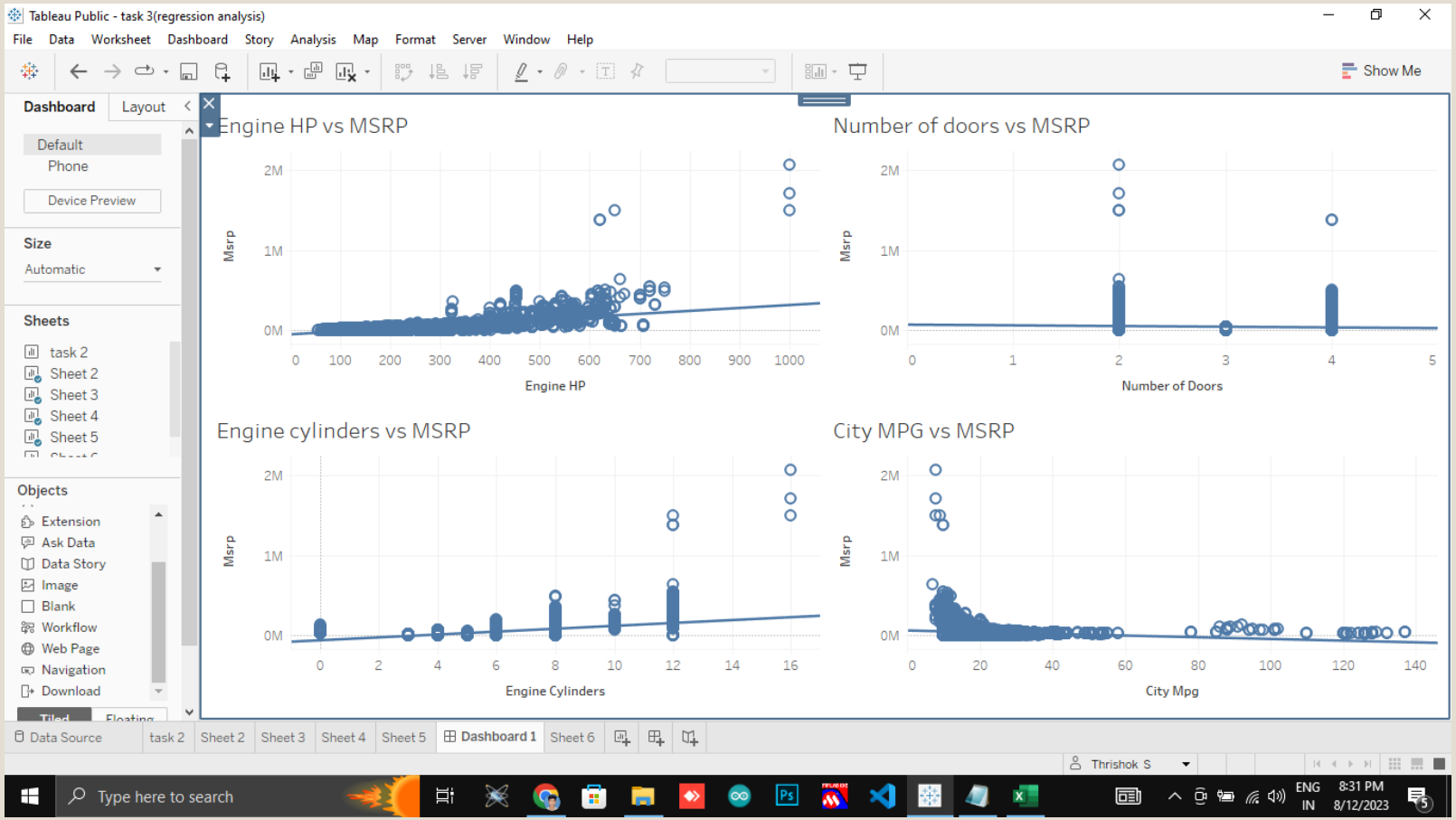
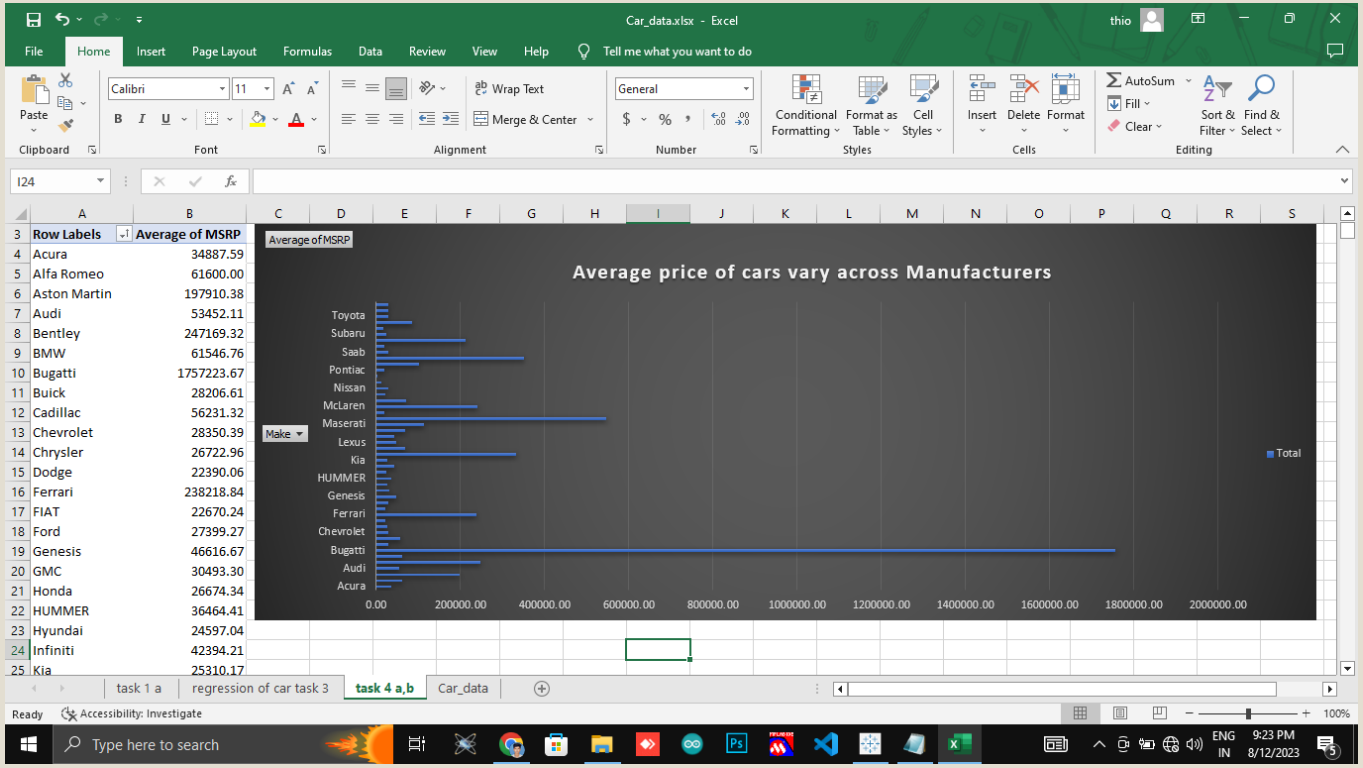
17							



From the previous slide and the above chart we are able to observe that Engine Horse power Has strongest relationship with Price.
Since range of R varies from -1 to +1 .
+1 means strong relation.
-1 means weak relation.

Task 4:

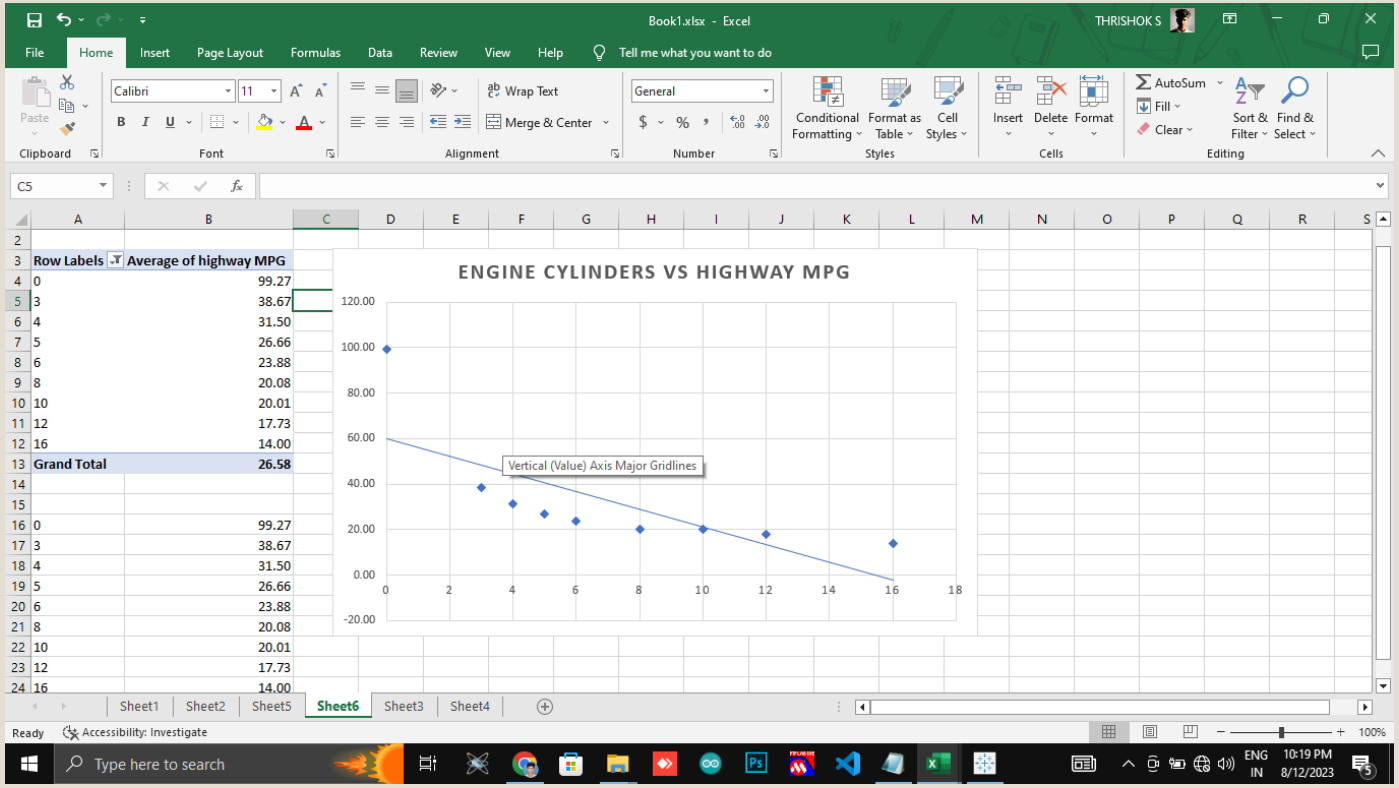
- Pivot table that shows the average price of cars for each manufacturer.
- Bar chart or a horizontal stacked bar chart that visualizes the relationship between manufacturer and average price.



Row Labels	Average of MSRP
Acura	34887.59
Alfa Romeo	61600.00
Aston Martin	197910.38
Audi	53452.11
Bentley	247169.32
BMW	61546.76
Bugatti	1757223.67
Buick	28206.61
Cadillac	56231.32
Chevrolet	28350.39
Chrysler	26722.96
Dodge	22390.06
Ferrari	238218.84
FIAT	22670.24
Ford	27399.27
Genesis	46616.67
GMC	30493.30
Honda	26674.34
HUMMER	36464.41
Hyundai	24597.04
Infiniti	42394.21
Kia	25310.17

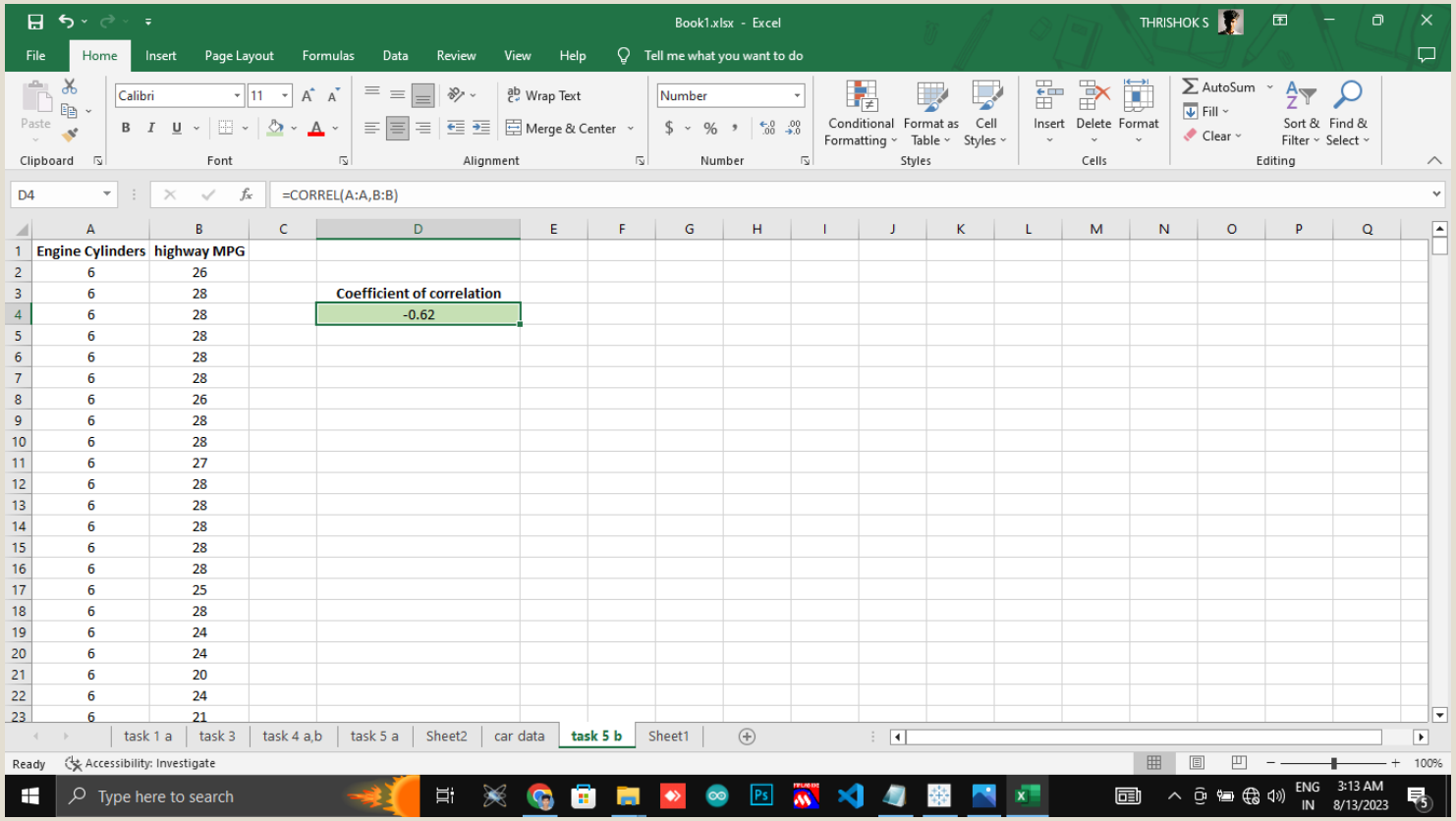
Task 5 a:

- Scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then a trendline is created on the scatter plot to visually estimate the slope of the relationship and assess its significance.



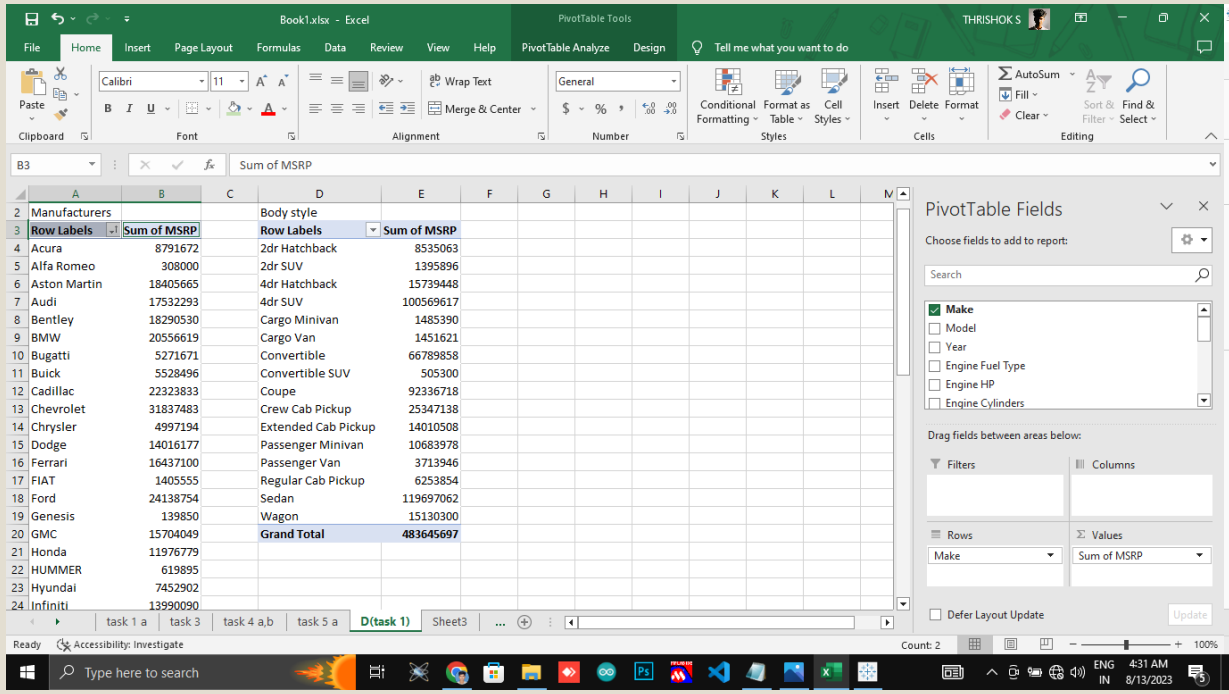
Task 5 b:

- correlation coefficient ranges between -1 to +1.
- From the obtained result -0.62 we came to know that as the Number of Engine cylinder increases Miles per gallon decreases.

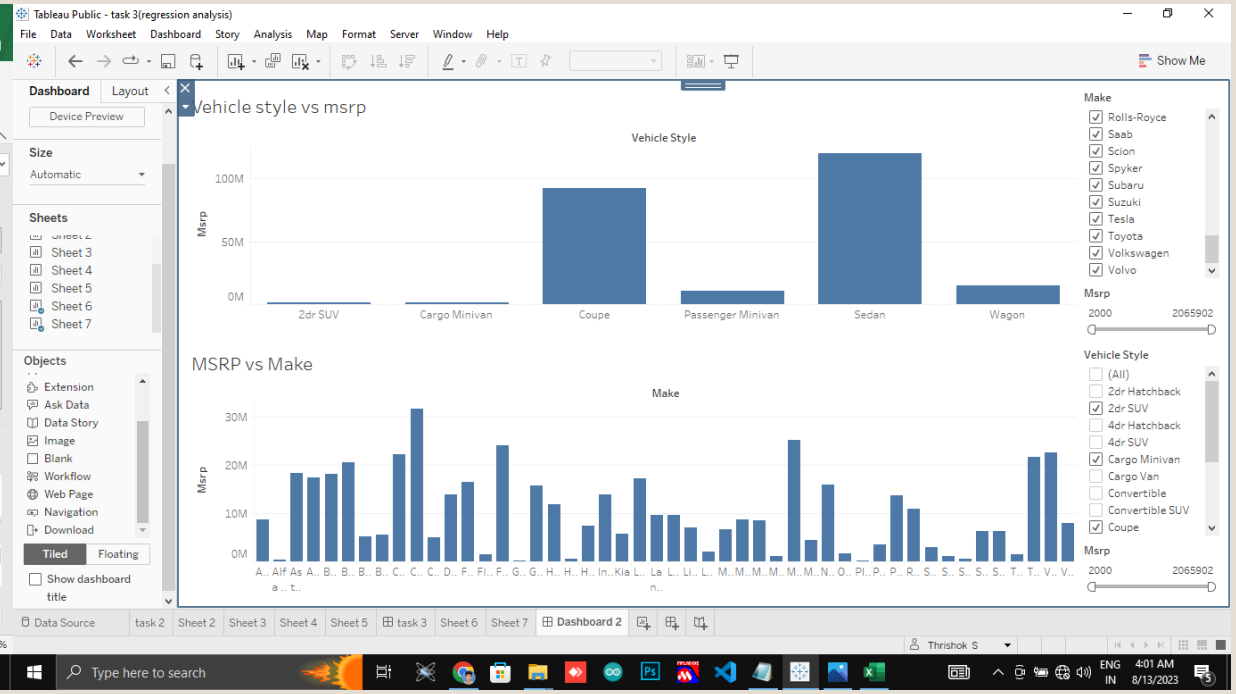


Building the Dashboard : Task 1

- The distribution of car prices vary by brand and body style.

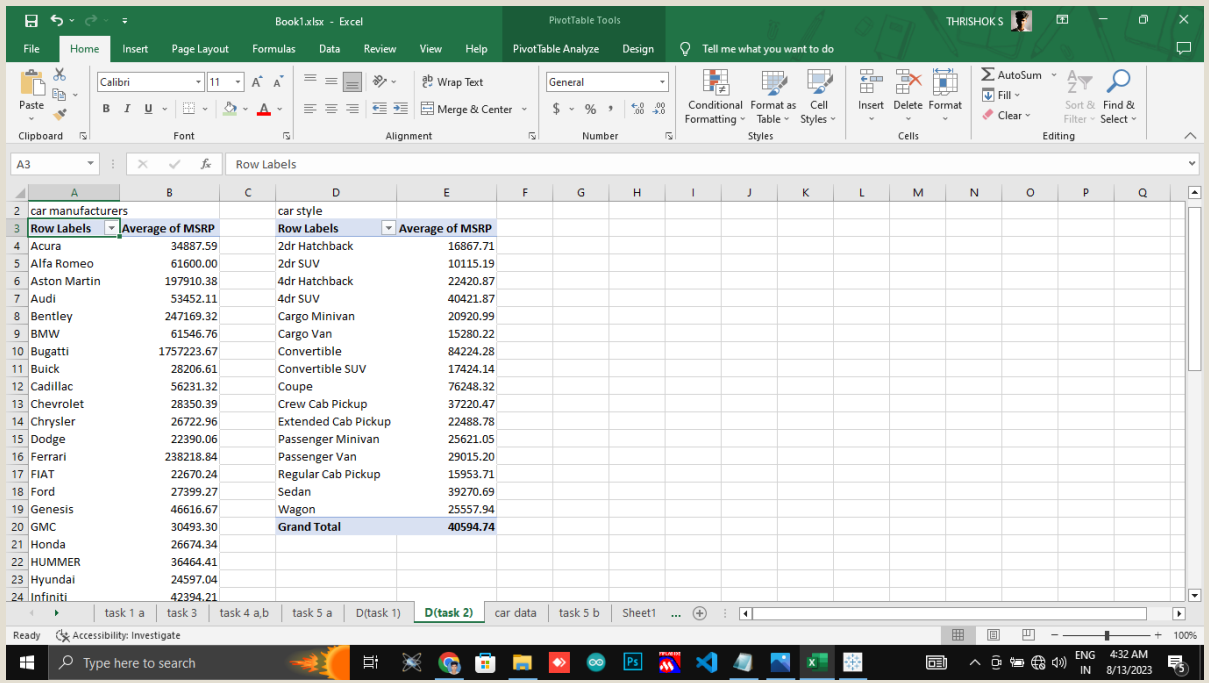


Manufacturers		Body style	
Row Labels	Sum of MSRP	Row Labels	Sum of MSRP
Acura	8791672	2dr Hatchback	8535063
Alfa Romeo	308000	2dr SUV	1395896
Aston Martin	18405665	4dr Hatchback	15739448
Audi	17532293	4dr SUV	100569617
Bentley	18290530	Cargo Minivan	1485390
BMW	20556619	Cargo Van	1451621
Bugatti	5271671	Convertible	66789858
Buick	5528496	Convertible SUV	505300
Cadillac	22323833	Coupe	92336718
Chevrolet	31837483	Crew Cab Pickup	25347138
Chrysler	4997194	Extended Cab Pickup	14010508
Dodge	14016177	Passenger Minivan	10683978
Ferrari	16437100	Passenger Van	3713946
FIAT	1405555	Regular Cab Pickup	6253854
Ford	24138754	Sedan	119697062
Genesis	139850	Wagon	15130300
GMC	15704049	Grand Total	483645697
Honda	11976779		
HUMMER	619895		
Hyundai	7452902		
Infiniti	13990090		



Task 2:

Car brands have the highest and lowest average MSRPs, and how does this varierd by body style

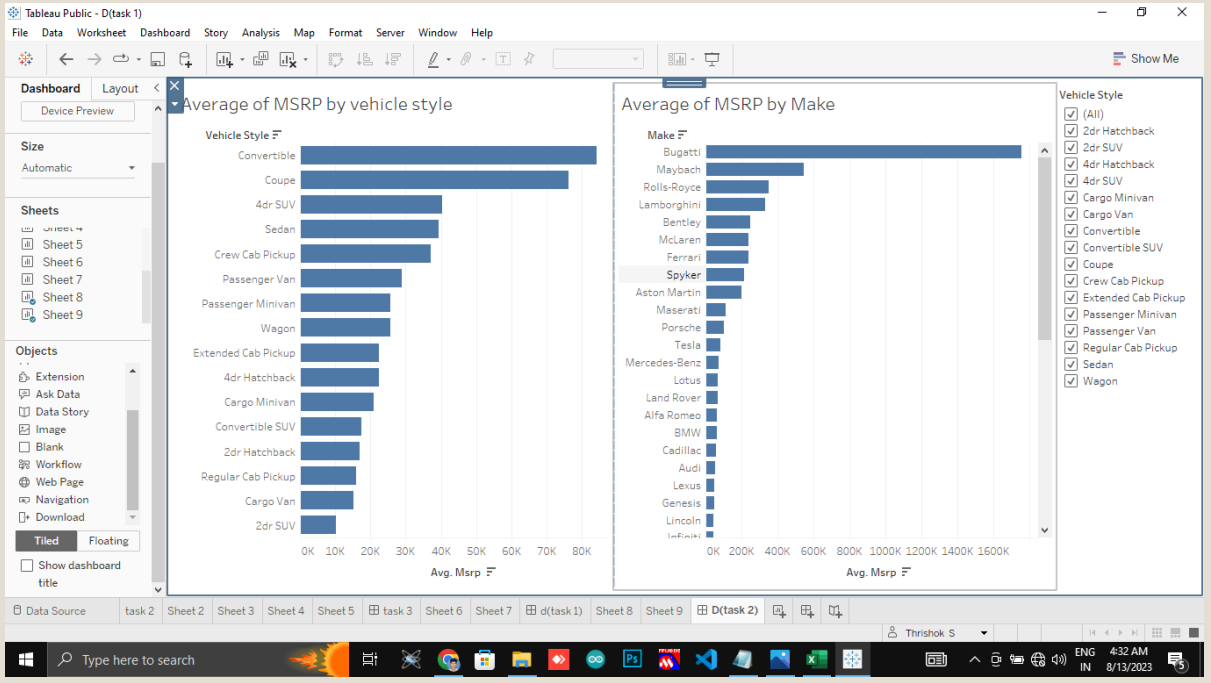


car manufacturers

Row Labels	Average of MSRP
Acura	34887.59
Alfa Romeo	61600.00
Aston Martin	197910.38
Audi	53452.11
Bentley	247169.32
BMW	61546.76
Bugatti	1757223.67
Buick	28206.61
Cadillac	56231.32
Chevrolet	28350.39
Chrysler	26722.96
Dodge	22390.06
Ferrari	238218.84
FIAT	22670.24
Ford	27399.27
Genesis	46616.67
GMC	30493.30
Honda	26674.34
HUMMER	36464.41
Hyundai	24597.04
Infiniti	42394.21

car style

Row Labels	Average of MSRP
2dr Hatchback	16867.71
2dr SUV	10115.19
4dr Hatchback	22420.87
4dr SUV	40421.87
Cargo Minivan	20920.99
Cargo Van	15280.22
Convertible	84224.28
Convertible SUV	17424.14
Coupe	76248.32
Crew Cab Pickup	37220.47
Extended Cab Pickup	22488.78
Passenger Minivan	25621.05
Passenger Van	29015.20
Regular Cab Pickup	15953.71
Sedan	39270.69
Wagon	25557.94
Grand Total	**40594.74**



Task 3:

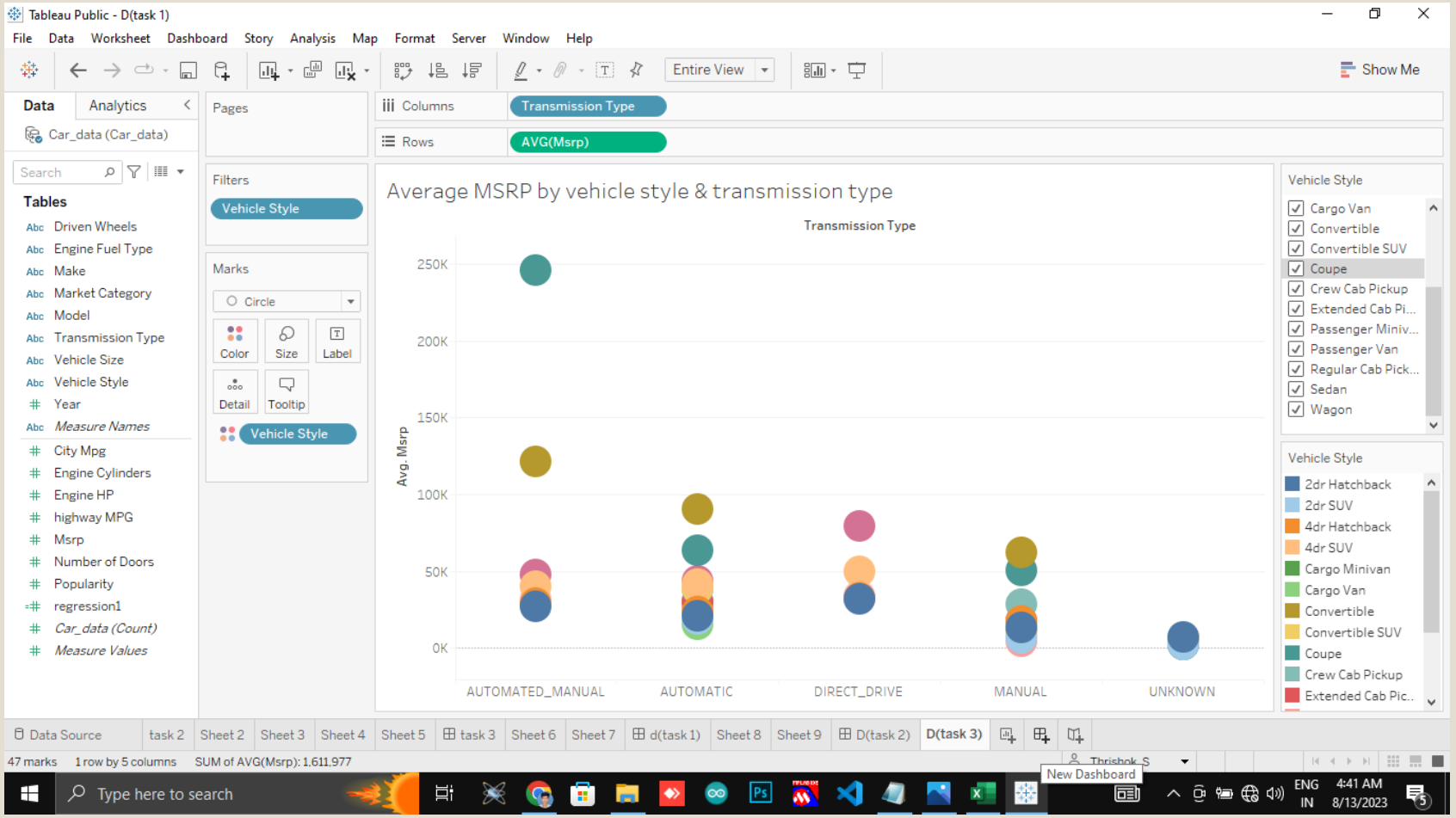


Tableau Public - D(task 1)
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Entire View
Show Me
Data
Analytics
Car_data (Car_data)
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Tables
Abc Driven Wheels
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Abc Make
Abc Market Category
Abc Model
Abc Transmission Type
Abc Vehicle Size
Abc Vehicle Style
Year
Abc Measure Names
City Mpg
Engine Cylinders
Engine HP
highway MPG
Msrp
Number of Doors
Popularity
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Filters
Vehicle Style
Marks
Circle
Color
Size
Label
Detail
Tooltip
Vehicle Style
Columns
Transmission Type
Rows
AVG(Msrp)
Average MSRP by vehicle style & transmission type
Transmission Type
Avg. Msrp
250K
200K
150K
100K
50K
0K
AUTOMATED_MANUAL
AUTOMATIC
DIRECT_DRIVE
MANUAL
UNKNOWN
Vehicle Style
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pi...
Passenger Miniv...
Passenger Van
Regular Cab Pick...
Sedan
Wagon
Vehicle Style
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pic..
Data Source
task 2
Sheet 2
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Sheet 5
task 3
Sheet 6
Sheet 7
d(task 1)
Sheet 8
Sheet 9
D(task 2)
D(task 3)
47 marks
1 row by 5 columns
SUM of AVG(Msrp): 1,611,977
New Dashboard
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ENG
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8/13/2023

Task 4:

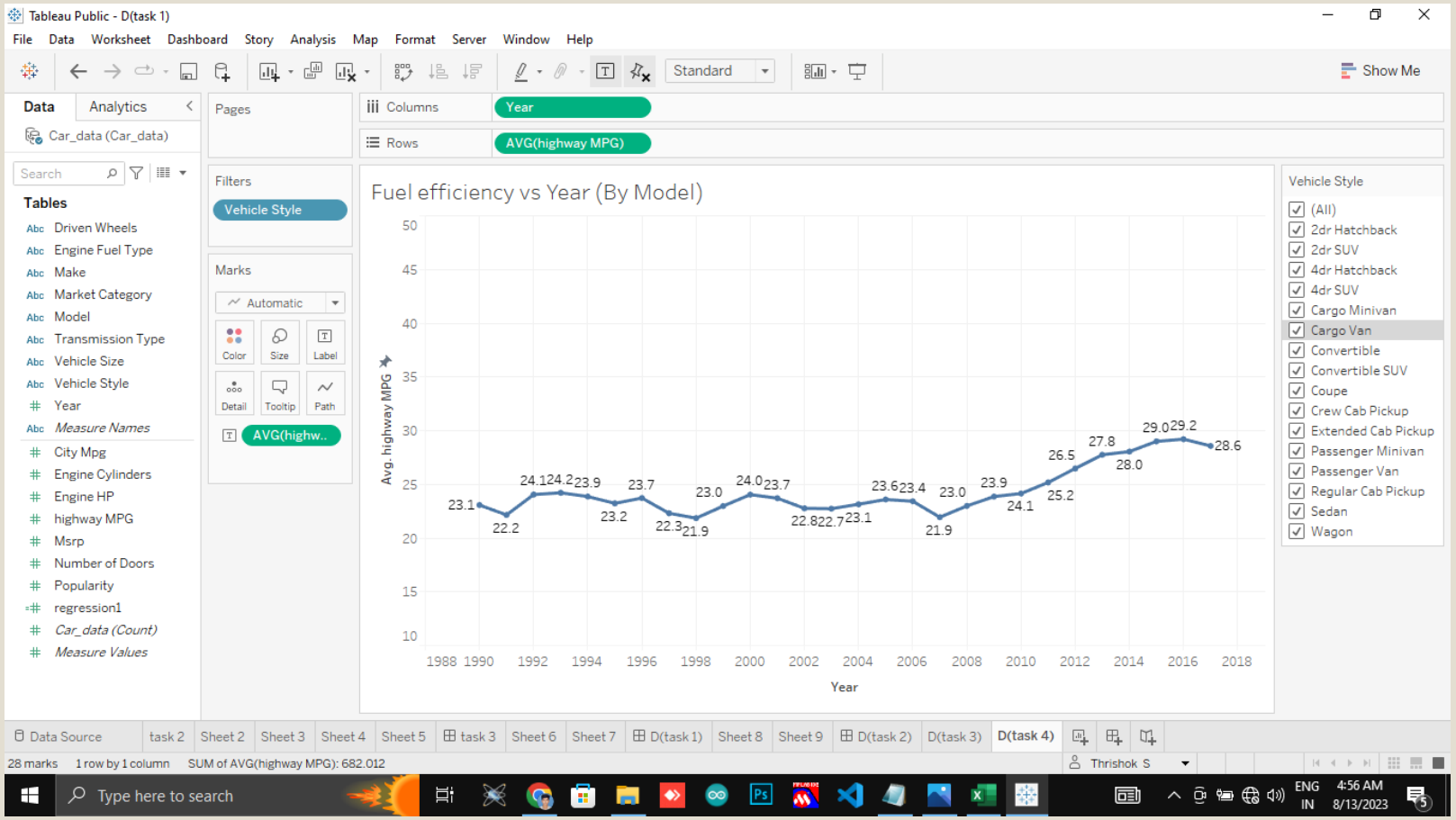
Tableau Public - D(task 1)
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data Analytics
Car_data (Car_data)
Search
Tables
Abc Driven Wheels
Abc Engine Fuel Type
Abc Make
Abc Market Category
Abc Model
Abc Transmission Type
Abc Vehicle Size
Abc Vehicle Style
Year
Abc Measure Names
City Mpg
Engine Cylinders
Engine HP
highway MPG
Msrp
Number of Doors
Popularity
regression1
Car_data (Count)
Measure Values
Pages
Columns Year
Rows AVG(highway MPG)
Filters
Vehicle Style
Marks
Automatic
Color Size Label
Detail Tooltip Path
AVG(highw..
Fuel efficiency vs Year (By Model)
Avg. highway MPG
Year
Vehicle Style
(All)
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Passenger Minivan
Passenger Van
Regular Cab Pickup
Sedan
Wagon
Data Source task 2 Sheet 2 Sheet 3 Sheet 4 Sheet 5 task 3 Sheet 6 Sheet 7 D(task 1) Sheet 8 Sheet 9 D(task 2) D(task 3) D(task 4)
28 marks 1 row by 1 column SUM of AVG(highway MPG): 682.012
Thrishok S
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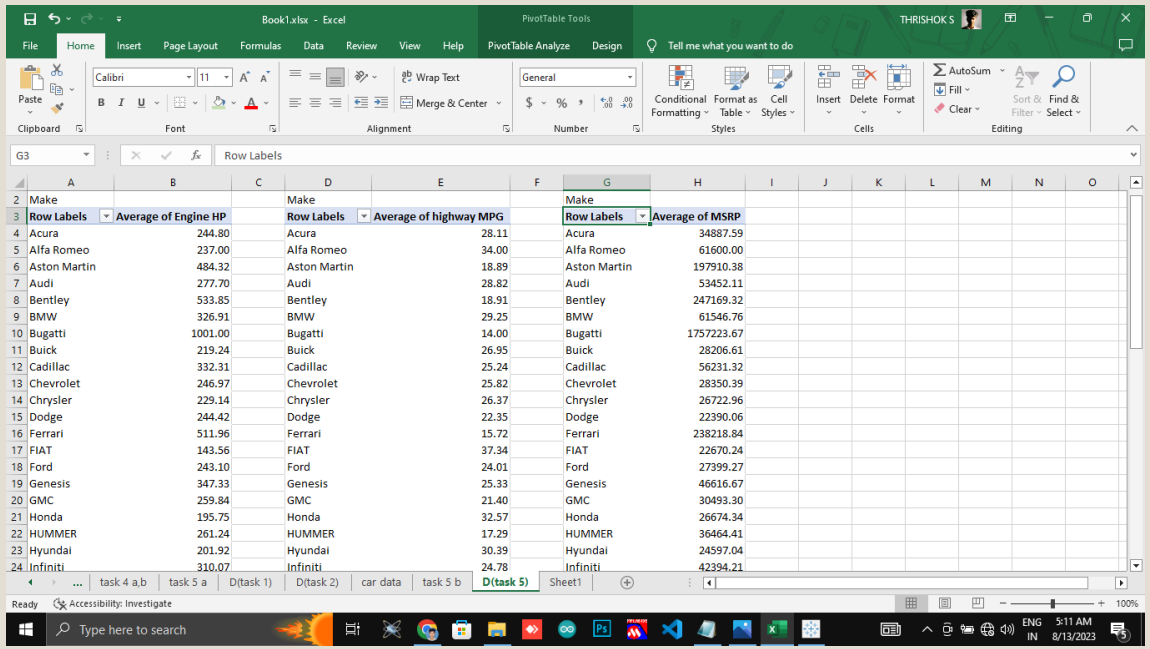
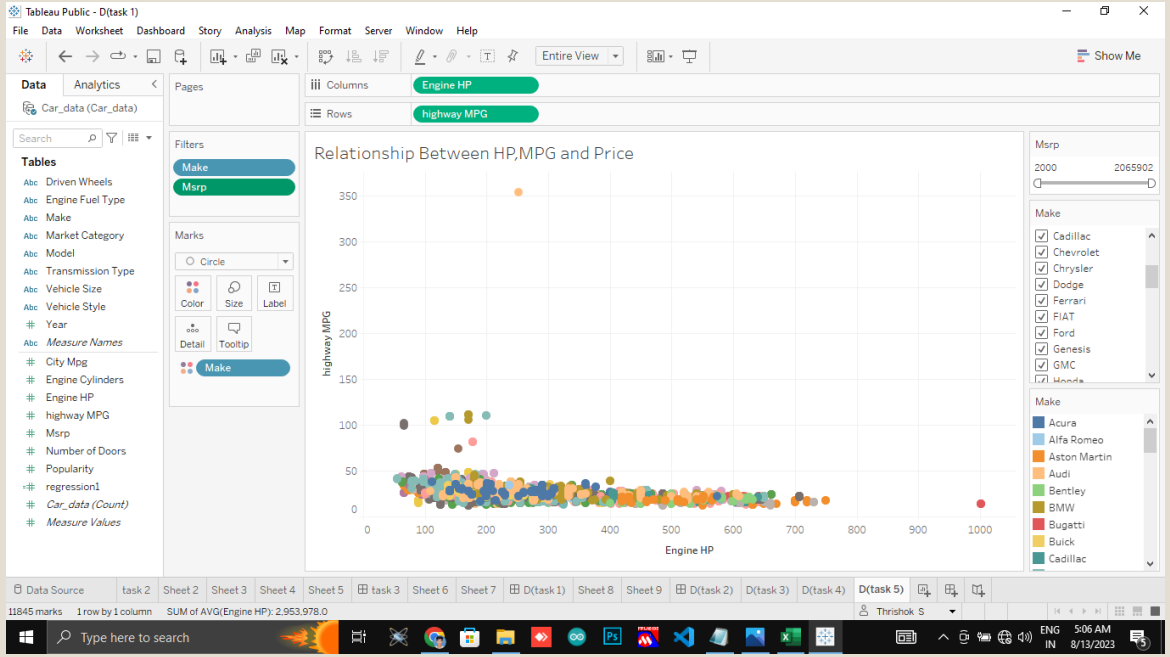
Task 5:



Make			Make			Make	
Row Labels	Average of Engine HP		Row Labels	Average of highway MPG		Row Labels	Average of MSRP
Acura	244.80		Acura	28.11		Acura	34887.59
Alfa Romeo	237.00		Alfa Romeo	34.00		Alfa Romeo	61600.00
Aston Martin	484.32		Aston Martin	18.89		Aston Martin	197910.38
Audi	277.70		Audi	28.82		Audi	53452.11
Bentley	533.85		Bentley	18.91		Bentley	247169.32
BMW	326.91		BMW	29.25		BMW	61546.76
Bugatti	1001.00		Bugatti	14.00		Bugatti	1757223.67
Buick	219.24		Buick	26.95		Buick	28206.61
Cadillac	332.31		Cadillac	25.24		Cadillac	56231.32
Chevrolet	246.97		Chevrolet	25.82		Chevrolet	28350.39
Chrysler	229.14		Chrysler	26.37		Chrysler	26722.96
Dodge	244.42		Dodge	22.35		Dodge	22390.06
Ferrari	511.96		Ferrari	15.72		Ferrari	238218.84
FIAT	143.56		FIAT	37.34		FIAT	22670.24
Ford	243.10		Ford	24.01		Ford	27399.27
Genesis	347.33		Genesis	25.33		Genesis	46616.67
GMC	259.84		GMC	21.40		GMC	30493.30
Honda	195.75		Honda	32.57		Honda	26674.34
HUMMER	261.24		HUMMER	17.29		HUMMER	36464.41
Hyundai	201.92		Hyundai	30.39		Hyundai	24597.04
Infiniti	310.07		Infiniti	24.78		Infiniti	42394.21



Result:

- I have completed this project, By using data analysis techniques such as regression analysis and market segmentation, the manufacturer could develop a pricing strategy that balances consumer demand with profitability, and identify which product features to focus on in future product development efforts.

Excel fille link - https://docs.google.com/spreadsheets/d/1jKf5snfWZuavN8RwH9ked0iAvRVa-CuN/edit?usp=sharing&ouid=101181995113560202220&rtpof=true&sd=true

Click the Tableau visualization to open in your web browser.

Thank you