In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [5]:
```
car =pd.read_csv('E:archive/cars_Project.csv')
car.head()
```

Out[5]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepower | MPG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | 265.0 | |
| **1** | Acura | RSX Type S 2dr | Sedan | Asia | Front | $23,820 | $21,761 | 2.0 | 4.0 | 200.0 | |
| **2** | Acura | TSX 4dr | Sedan | Asia | Front | $26,990 | $24,647 | 2.4 | 4.0 | 200.0 | |
| **3** | Acura | TL 4dr | Sedan | Asia | Front | $33,195 | $30,299 | 3.2 | 6.0 | 270.0 | |
| **4** | Acura | 3.5 RL 4dr | Sedan | Asia | Front | $43,755 | $39,014 | 3.5 | 6.0 | 225.0 | |

In [6]:
```
car.shape
```

Out[6]:
```
(432, 15)
```

# 1)instruction(For Data cleaning)

# Find a Null value in the dataSet/if there is any Null value in the column,then fill it with mean of that column

In [8]:
```
car.isnull().sum() # isnull() is used to finf the null value in the dataset
```

Out[8]:
```
Make          4
Model         4
Type          4
Origin        4
DriveTrain    4
MSRP          4
Invoice       4
EngineSize    4
Cylinders     6
Horsepower    4
MPG_City      4
MPG_Highway   4
Weight        4
Wheelbase     4
```

```
Length         4
dtype: int64
```

In [14]:
```
car["Cylinders"].fillna(car["Cylinders"].mean(),inplace =True) # inplace is used to mak
```

In [15]:
```
car.isnull().sum()
```

Out[15]:
```
Make           4
Model          4
Type           4
Origin         4
DriveTrain     4
MSRP           4
Invoice        4
EngineSize     4
Cylinders      0
Horsepower     4
MPG_City       4
MPG_Highway    4
Weight         4
Wheelbase      4
Length         4
dtype: int64
```

# 2)Question(based on value counts)

# checl what are the different type of Make inour Dataset.And what is the count(occurrence) of each make in the data

In [19]:
```
car.head(2)
```

Out[19]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepower | MPG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | 265.0 | |
| **1** | Acura | RSX Type S 2dr | Sedan | Asia | Front | $23,820 | $21,761 | 2.0 | 4.0 | 200.0 | |

In [20]:
```
car["Make"].value_counts()
```

Out[20]:
```
Toyota           28
Chevrolet        27
Mercedes-Benz    26
Ford             23
BMW              20
Audi             19
Honda            17
Nissan           17
Chrysler         15
```

```
Volkswagen       15
Dodge            13
Mitsubishi       13
Hyundai          12
Jaguar           12
Volvo            12
Pontiac          11
Subaru           11
Kia              11
Mazda            11
Lexus            11
Buick             9
Lincoln           9
Mercury           9
Cadillac          8
Infiniti          8
GMC               8
Suzuki            8
Saturn            8
Saab              7
Porsche           7
Acura             7
Land Rover        3
Jeep              3
Oldsmobile        3
Scion             2
Isuzu             2
MINI              2
Hummer            1
Name: Make, dtype: int64
```

# Instructions(Filtering)

# .Show all the records where origin is Asia or Europe.

In [26]:
```
c =car[car["Origin"].isin(["Asia","Europe"])]
c.head(30)
```

Out[26]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepow |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | 265 |
| **1** | Acura | RSX Type S 2dr | Sedan | Asia | Front | $23,820 | $21,761 | 2.0 | 4.0 | 200 |
| **2** | Acura | TSX 4dr | Sedan | Asia | Front | $26,990 | $24,647 | 2.4 | 4.0 | 200 |
| **3** | Acura | TL 4dr | Sedan | Asia | Front | $33,195 | $30,299 | 3.2 | 6.0 | 270 |
| **4** | Acura | 3.5 RL 4dr | Sedan | Asia | Front | $43,755 | $39,014 | 3.5 | 6.0 | 225 |
| **5** | Acura | 3.5 RL w/Navigation 4dr | Sedan | Asia | Front | $46,100 | $41,100 | 3.5 | 6.0 | 225 |
| **6** | Acura | NSX coupe 2dr manual S | Sports | Asia | Rear | $89,765 | $79,978 | 3.2 | 6.0 | 290 |

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepow |
|---|---|---|---|---|---|---|---|---|---|---|
| **7** | Audi | A4 1.8T 4dr | Sedan | Europe | Front | $25,940 | $23,508 | 1.8 | 4.0 | 170 |
| **8** | Audi | A41.8T convertible 2dr | Sedan | Europe | Front | $35,940 | $32,506 | 1.8 | 4.0 | 170 |
| **9** | Audi | A4 3.0 4dr | Sedan | Europe | Front | $31,840 | $28,846 | 3.0 | 6.0 | 220 |
| **10** | Audi | A4 3.0 Quattro 4dr manual | Sedan | Europe | All | $33,430 | $30,366 | 3.0 | 6.0 | 220 |
| **11** | Audi | A4 3.0 Quattro 4dr auto | Sedan | Europe | All | $34,480 | $31,388 | 3.0 | 6.0 | 220 |
| **12** | Audi | A6 3.0 4dr | Sedan | Europe | Front | $36,640 | $33,129 | 3.0 | 6.0 | 220 |
| **13** | Audi | A6 3.0 Quattro 4dr | Sedan | Europe | All | $39,640 | $35,992 | 3.0 | 6.0 | 220 |
| **14** | Audi | A4 3.0 convertible 2dr | Sedan | Europe | Front | $42,490 | $38,325 | 3.0 | 6.0 | 220 |
| **15** | Audi | A4 3.0 Quattro convertible 2dr | Sedan | Europe | All | $44,240 | $40,075 | 3.0 | 6.0 | 220 |
| **16** | Audi | A6 2.7 Turbo Quattro 4dr | Sedan | Europe | All | $42,840 | $38,840 | 2.7 | 6.0 | 250 |
| **17** | Audi | A6 4.2 Quattro 4dr | Sedan | Europe | All | $49,690 | $44,936 | 4.2 | 8.0 | 300 |
| **18** | Audi | A8 L Quattro 4dr | Sedan | Europe | All | $69,190 | $64,740 | 4.2 | 8.0 | 330 |
| **19** | Audi | S4 Quattro 4dr | Sedan | Europe | All | $48,040 | $43,556 | 4.2 | 8.0 | 340 |
| **20** | Audi | RS 6 4dr | Sports | Europe | Front | $84,600 | $76,417 | 4.2 | 8.0 | 450 |
| **21** | Audi | TT 1.8 convertible 2dr (coupe) | Sports | Europe | Front | $35,940 | $32,512 | 1.8 | 4.0 | 180 |
| **22** | Audi | TT 1.8 Quattro 2dr (convertible) | Sports | Europe | All | $37,390 | $33,891 | 1.8 | 4.0 | 225 |
| **23** | Audi | TT 3.2 coupe 2dr (convertible) | Sports | Europe | All | $40,590 | $36,739 | 3.2 | 6.0 | 250 |
| **24** | Audi | A6 3.0 Avant Quattro | Wagon | Europe | All | $40,840 | $37,060 | 3.0 | 6.0 | 220 |
| **25** | Audi | S4 Avant Quattro | Wagon | Europe | All | $49,090 | $44,446 | 4.2 | 8.0 | 340 |
| **26** | BMW | X3 3.0i | SUV | Europe | All | $37,000 | $33,873 | 3.0 | 6.0 | 225 |

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepow |
|---|---|---|---|---|---|---|---|---|---|---|
| **27** | BMW | X5 4.4i | SUV | Europe | All | $52,195 | $47,720 | 4.4 | 8.0 | 325 |
| **28** | BMW | 325i 4dr | Sedan | Europe | Rear | $28,495 | $26,155 | 2.5 | 6.0 | 184 |
| **29** | BMW | 325Ci 2dr | Sedan | Europe | Rear | $30,795 | $28,245 | 2.5 | 6.0 | 184 |

In [25]:
```
c.shape
```

Out[25]: (281, 15)

# Instruction(Removing unwanted records)

# Remove all the records(rows) where weight is above 4000

In [29]:
```
car[car['Weight'] >4000]
```

Out[29]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horse |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | |
| **15** | Audi | A4 3.0 Quattro convertible 2dr | Sedan | Europe | All | $44,240 | $40,075 | 3.0 | 6.0 | |
| **17** | Audi | A6 4.2 Quattro 4dr | Sedan | Europe | All | $49,690 | $44,936 | 4.2 | 8.0 | |
| **18** | Audi | A8 L Quattro 4dr | Sedan | Europe | All | $69,190 | $64,740 | 4.2 | 8.0 | |
| **20** | Audi | RS 6 4dr | Sports | Europe | Front | $84,600 | $76,417 | 4.2 | 8.0 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **405** | Volkswagen | Touareg V6 | SUV | Europe | All | $35,515 | $32,243 | 3.2 | 6.0 | |
| **415** | Volkswagen | Phaeton 4dr | Sedan | Europe | Front | $65,000 | $59,912 | 4.2 | 8.0 | |
| **416** | Volkswagen | Phaeton W12 4dr | Sedan | Europe | Front | $75,000 | $69,130 | 6.0 | 12.0 | |
| **419** | Volkswagen | Passat W8 | Wagon | Europe | Front | $40,235 | $36,956 | 4.0 | 8.0 | |
| **420** | Volvo | XC90 T6 | SUV | Europe | All | $41,250 | $38,851 | 2.9 | 6.0 | |

103 rows × 15 columns

In [33]:
```
d =car[~(car['Weight'] >4000)]
d.head()
d.shape
```

Out[33]: (329, 15)

In [35]:
```
d[d['Weight'] >4000] # no vale
```

Out[35]:

| Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepower | MPG_Cit |
|---|---|---|---|---|---|---|---|---|---|---|

# Instruction(Applying function a column)

# Increase all the value of "MPG_CITY" by 3

In [36]:
```
car
```

Out[36]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepowe |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | 265.( |
| **1** | Acura | RSX Type S 2dr | Sedan | Asia | Front | $23,820 | $21,761 | 2.0 | 4.0 | 200.( |
| **2** | Acura | TSX 4dr | Sedan | Asia | Front | $26,990 | $24,647 | 2.4 | 4.0 | 200.( |
| **3** | Acura | TL 4dr | Sedan | Asia | Front | $33,195 | $30,299 | 3.2 | 6.0 | 270.( |
| **4** | Acura | 3.5 RL 4dr | Sedan | Asia | Front | $43,755 | $39,014 | 3.5 | 6.0 | 225.( |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | .. |
| **427** | Volvo | C70 LPT convertible 2dr | Sedan | Europe | Front | $40,565 | $38,203 | 2.4 | 5.0 | 197.( |
| **428** | Volvo | C70 HPT convertible 2dr | Sedan | Europe | Front | $42,565 | $40,083 | 2.3 | 5.0 | 242.( |
| **429** | Volvo | S80 T6 4dr | Sedan | Europe | Front | $45,210 | $42,573 | 2.9 | 6.0 | 268.( |
| **430** | Volvo | V40 | Wagon | Europe | Front | $26,135 | $24,641 | 1.9 | 4.0 | 170.( |
| **431** | Volvo | XC70 | Wagon | Europe | All | $35,145 | $33,112 | 2.5 | 5.0 | 208.( |

432 rows × 15 columns

In [40]:
```
car["MPG_City"]=car["MPG_City"].apply(lambda x:x+ 3) # for the purpose of ncreaent
```

```
car
```

Out[40]:

| | Make | Model | Type | Origin | DriveTrain | MSRP | Invoice | EngineSize | Cylinders | Horsepowe |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acura | MDX | SUV | Asia | All | $36,945 | $33,337 | 3.5 | 6.0 | 265.( |
| **1** | Acura | RSX Type S 2dr | Sedan | Asia | Front | $23,820 | $21,761 | 2.0 | 4.0 | 200.( |
| **2** | Acura | TSX 4dr | Sedan | Asia | Front | $26,990 | $24,647 | 2.4 | 4.0 | 200.( |
| **3** | Acura | TL 4dr | Sedan | Asia | Front | $33,195 | $30,299 | 3.2 | 6.0 | 270.( |
| **4** | Acura | 3.5 RL 4dr | Sedan | Asia | Front | $43,755 | $39,014 | 3.5 | 6.0 | 225.( |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | .. |
| **427** | Volvo | C70 LPT convertible 2dr | Sedan | Europe | Front | $40,565 | $38,203 | 2.4 | 5.0 | 197.( |
| **428** | Volvo | C70 HPT convertible 2dr | Sedan | Europe | Front | $42,565 | $40,083 | 2.3 | 5.0 | 242.( |
| **429** | Volvo | S80 T6 4dr | Sedan | Europe | Front | $45,210 | $42,573 | 2.9 | 6.0 | 268.( |
| **430** | Volvo | V40 | Wagon | Europe | Front | $26,135 | $24,641 | 1.9 | 4.0 | 170.( |
| **431** | Volvo | XC70 | Wagon | Europe | All | $35,145 | $33,112 | 2.5 | 5.0 | 208.( |

432 rows × 15 columns

In [ ]: