In [1]:
```
import pandas as pd
```

In [2]:
```
data = pd.read_csv('CARS.csv')
```

In [3]:
```
type(data)
```

Out[3]:
```
pandas.core.frame.DataFrame
```

In [4]:
```
data.info
```

Out[4]:
```
<bound method DataFrame.info of       Make                Model   Type  Origin DriveT
rain     MSRP  \
0    Acura                  MDX    SUV    Asia      All  $36,945
1    Acura       RSX Type S 2dr  Sedan    Asia    Front  $23,820
2    Acura              TSX 4dr  Sedan    Asia    Front  $26,990
3    Acura               TL 4dr  Sedan    Asia    Front  $33,195
4    Acura           3.5 RL 4dr  Sedan    Asia    Front  $43,755
..     ...                  ...    ...     ...      ...      ...
423  Volvo  C70 LPT convertible 2dr  Sedan  Europe    Front  $40,565
424  Volvo  C70 HPT convertible 2dr  Sedan  Europe    Front  $42,565
425  Volvo           S80 T6 4dr  Sedan  Europe    Front  $45,210
426  Volvo                  V40  Wagon  Europe    Front  $26,135
427  Volvo                 XC70  Wagon  Europe      All  $35,145

     Invoice  EngineSize  Cylinders  Horsepower  MPG_City  MPG_Highway  \
0    $33,337         3.5        6.0         265        17           23
1    $21,761         2.0        4.0         200        24           31
2    $24,647         2.4        4.0         200        22           29
3    $30,299         3.2        6.0         270        20           28
4    $39,014         3.5        6.0         225        18           24
..       ...         ...        ...         ...       ...          ...
423  $38,203         2.4        5.0         197        21           28
424  $40,083         2.3        5.0         242        20           26
425  $42,573         2.9        6.0         268        19           26
426  $24,641         1.9        4.0         170        22           29
427  $33,112         2.5        5.0         208        20           27

     Weight  Wheelbase  Length
0      4451        106     189
1      2778        101     172
2      3230        105     183
3      3575        108     186
4      3880        115     197
..      ...        ...     ...
423    3450        105     186
424    3450        105     186
425    3653        110     190
426    2822        101     180
427    3823        109     186

[428 rows x 15 columns]>
```

In [5]:
```
data.describe()
```

Out[5]:

	EngineSize	Cylinders	Horsepower	MPG_City	MPG_Highway	Weight	Whe
count	428.000000	426.000000	428.000000	428.000000	428.000000	428.000000	428.
mean	3.196729	5.807512	215.885514	20.060748	26.843458	3577.953271	108.
std	1.108595	1.558443	71.836032	5.238218	5.741201	758.983215	8.
min	1.300000	3.000000	73.000000	10.000000	12.000000	1850.000000	89.
25%	2.375000	4.000000	165.000000	17.000000	24.000000	3104.000000	103.
50%	3.000000	6.000000	210.000000	19.000000	26.000000	3474.500000	107.
75%	3.900000	6.000000	255.000000	21.250000	29.000000	3977.750000	112.
max	8.300000	12.000000	500.000000	60.000000	66.000000	7190.000000	144.

In [8]:
```
data=data.drop_duplicates()
data
```

Out[8]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinders
0	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6.(
1	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0	4.(
2	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4	4.(
3	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2	6.(
4	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5	6.(
...	...	...	...	...	...	...	...	...	..
423	Volvo	C70 LPT convertible 2dr	Sedan	Europe	Front	$40,565	$38,203	2.4	5.(
424	Volvo	C70 HPT convertible 2dr	Sedan	Europe	Front	$42,565	$40,083	2.3	5.(
425	Volvo	S80 T6 4dr	Sedan	Europe	Front	$45,210	$42,573	2.9	6.(
426	Volvo	V40	Wagon	Europe	Front	$26,135	$24,641	1.9	4.(
427	Volvo	XC70	Wagon	Europe	All	$35,145	$33,112	2.5	5.(

428 rows × 15 columns

In [9]:
```
data.isnull()
```

Out[9]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinders	Horse
0	False	False	False	False	False	False	False	False	False	
1	False	False	False	False	False	False	False	False	False	
2	False	False	False	False	False	False	False	False	False	
3	False	False	False	False	False	False	False	False	False	
4	False	False	False	False	False	False	False	False	False	
...	...	...	...	...	...	...	...	...	...	
423	False	False	False	False	False	False	False	False	False	
424	False	False	False	False	False	False	False	False	False	
425	False	False	False	False	False	False	False	False	False	
426	False	False	False	False	False	False	False	False	False	
427	False	False	False	False	False	False	False	False	False	

428 rows × 15 columns

In [10]:
```
data.isnull().sum()
```

Out[10]:
```
Make          0
Model         0
Type          0
Origin        0
DriveTrain    0
MSRP          0
Invoice       0
EngineSize    0
Cylinders     2
Horsepower    0
MPG_City      0
MPG_Highway   0
Weight        0
Wheelbase     0
Length        0
dtype: int64
```

In [11]:
```
data.notnull()
```

Out[11]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinders	Horse
0	True	True	True	True	True	True	True	True	True	
1	True	True	True	True	True	True	True	True	True	
2	True	True	True	True	True	True	True	True	True	
3	True	True	True	True	True	True	True	True	True	
4	True	True	True	True	True	True	True	True	True	
...	...	...	...	...	...	...	...	...	...	
423	True	True	True	True	True	True	True	True	True	
424	True	True	True	True	True	True	True	True	True	
425	True	True	True	True	True	True	True	True	True	
426	True	True	True	True	True	True	True	True	True	
427	True	True	True	True	True	True	True	True	True	

428 rows × 15 columns

In [12]:
```
data.isnull().sum().sum()
```

Out[12]:
```
2
```

In [13]:
```
data2 = data.fillna(value=0)
data2
```

Out[13]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinder
0	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6.(
1	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0	4.(
2	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4	4.(
3	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2	6.(
4	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5	6.(
...	...	...	...	...	...	...	...	...	..
423	Volvo	C70 LPT convertible 2dr	Sedan	Europe	Front	$40,565	$38,203	2.4	5.(
424	Volvo	C70 HPT convertible 2dr	Sedan	Europe	Front	$42,565	$40,083	2.3	5.(
425	Volvo	S80 T6 4dr	Sedan	Europe	Front	$45,210	$42,573	2.9	6.(
426	Volvo	V40	Wagon	Europe	Front	$26,135	$24,641	1.9	4.(
427	Volvo	XC70	Wagon	Europe	All	$35,145	$33,112	2.5	5.(

428 rows × 15 columns

In [14]:
```
data3 =data.fillna(method='pad')
data3
```

Out[14]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinder:
0	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6.(
1	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0	4.(
2	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4	4.(
3	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2	6.(
4	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5	6.(
...	...	...	...	...	...	...	...	...	..
423	Volvo	C70 LPT convertible 2dr	Sedan	Europe	Front	$40,565	$38,203	2.4	5.(
424	Volvo	C70 HPT convertible 2dr	Sedan	Europe	Front	$42,565	$40,083	2.3	5.(
425	Volvo	S80 T6 4dr	Sedan	Europe	Front	$45,210	$42,573	2.9	6.(
426	Volvo	V40	Wagon	Europe	Front	$26,135	$24,641	1.9	4.(
427	Volvo	XC70	Wagon	Europe	All	$35,145	$33,112	2.5	5.(

428 rows × 15 columns

In [15]:
```
data4=data.fillna(method='bfill')
data4
```

Out[15]:

	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinders
0	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6.
1	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0	4.
2	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4	4.
3	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2	6.
4	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5	6.
...	...	...	...	...	...	...	...	...	..
423	Volvo	C70 LPT convertible 2dr	Sedan	Europe	Front	$40,565	$38,203	2.4	5.
424	Volvo	C70 HPT convertible 2dr	Sedan	Europe	Front	$42,565	$40,083	2.3	5.
425	Volvo	S80 T6 4dr	Sedan	Europe	Front	$45,210	$42,573	2.9	6.
426	Volvo	V40	Wagon	Europe	Front	$26,135	$24,641	1.9	4.
427	Volvo	XC70	Wagon	Europe	All	$35,145	$33,112	2.5	5.

428 rows × 15 columns

In [16]:
```
import numpy as np
from scipy import stats
```

In [17]:
```
data2.columns
```

Out[17]:
```
Index(['Make', 'Model', 'Type', 'Origin', 'DriveTrain', 'MSRP', 'Invoice',
       'EngineSize', 'Cylinders', 'Horsepower', 'MPG_City', 'MPG_Highway',
       'Weight', 'Wheelbase', 'Length'],
      dtype='object')
```

In [21]:
```
data2.drop(['Model'], axis=1, inplace=True)
data2.columns
```

Out[21]:
```
Index(['Type', 'Origin', 'DriveTrain', 'MSRP', 'Invoice', 'EngineSize',
       'Cylinders', 'Horsepower', 'MPG_City', 'MPG_Highway', 'Weight',
       'Wheelbase', 'Length'],
      dtype='object')
```

In [22]:
```
data2.drop(['MSRP'], axis=1, inplace=True)
data2.columns
```

Out[22]:
```
Index(['Type', 'Origin', 'DriveTrain', 'Invoice', 'EngineSize', 'Cylinders',
       'Horsepower', 'MPG_City', 'MPG_Highway', 'Weight', 'Wheelbase',
       'Length'],
      dtype='object')
```

In [25]:
```
Q1= data2.quantile(0.25)
Q3=data2.quantile(0.75)
IQR=Q3-Q1
print(IQR)
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\frame.py:10882, in DataFra
me.quantile(self, q, axis, numeric_only, interpolation, method)
  10875 axis = self._get_axis_number(axis)
  10877 if not is_list_like(q):
  10878     # BlockManager.quantile expects listlike, so we wrap and unwrap here
  10879     # error: List item 0 has incompatible type "Union[float, Union[Union[
  10880     # ExtensionArray, ndarray[Any, Any]], Index, Series], Sequence[floa
t]]";
  10881     # expected "float"
> 10882     res_df = self.quantile(  # type: ignore[call-overload]
  10883         [q],
  10884         axis=axis,
  10885         numeric_only=numeric_only,
  10886         interpolation=interpolation,
  10887         method=method,
  10888     )
  10889     if method == "single":
  10890         res = res_df.iloc[0]

File ~\anaconda3\Lib\site-packages\pandas\core\frame.py:10927, in DataFra
```

In [ ]: