In [432]:
```
# Name---Ankit
#Email id---mrankit1950@gmail.com
```

In [56]:
```
import pandas as pd
import numpy as np
import datetime
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [57]:
```
car=pd.read_csv(r"C:\Users\ANKIT MALL-PC\Desktop\CarPrice (1).txt")
car
```

Out[57]:

	car_ID	symboling	CarName	fueltype	aspiration	doornumber	carbody	drivewheel	ei
0	1	3	alfa-romero giulia	gas	std	two	convertible	rwd	
1	2	3	alfa-romero stelvio	gas	std	two	convertible	rwd	
2	3	1	alfa-romero Quadrifoglio	gas	std	two	hatchback	rwd	
3	4	2	audi 100 ls	gas	std	four	sedan	fwd	
4	5	2	audi 100ls	gas	std	four	sedan	4wd	
...	...	...	...	...	...	...	...	...	
200	201	-1	volvo 145e (sw)	gas	std	four	sedan	rwd	
201	202	-1	volvo 144ea	gas	turbo	four	sedan	rwd	
202	203	-1	volvo 244dl	gas	std	four	sedan	rwd	
203	204	-1	volvo 246	diesel	turbo	four	sedan	rwd	
204	205	-1	volvo 264gl	gas	turbo	four	sedan	rwd	

205 rows × 26 columns

In [58]:
```
1 car.head()
```

Out[58]:

	car_ID	symboling	CarName	fueltype	aspiration	doornumber	carbody	drivewheel	engi
0	1	3	alfa-romero giulia	gas	std	two	convertible	rwd	
1	2	3	alfa-romero stelvio	gas	std	two	convertible	rwd	
2	3	1	alfa-romero Quadrifoglio	gas	std	two	hatchback	rwd	
3	4	2	audi 100 ls	gas	std	four	sedan	fwd	
4	5	2	audi 100ls	gas	std	four	sedan	4wd	

5 rows × 26 columns

In [59]:
```
1 car.shape
```

Out[59]:
```
(205, 26)
```

In [60]:
```
1 car.isnull().sum()
```

Out[60]:
```
car_ID            0
symboling         0
CarName           0
fueltype          0
aspiration        0
doornumber        0
carbody           0
drivewheel        0
enginelocation    0
wheelbase         0
carlength         0
carwidth          0
carheight         0
curbweight        0
enginetype        0
cylindernumber    0
enginesize        0
fuelsystem        0
boreratio         0
stroke            0
compressionratio  0
horsepower        0
peakrpm           0
citympg           0
highwaympg        0
price             0
dtype: int64
```

In [61]:
```
1 car.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 205 entries, 0 to 204
Data columns (total 26 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   car_ID            205 non-null    int64
 1   symboling         205 non-null    int64
 2   CarName           205 non-null    object
 3   fueltype          205 non-null    object
 4   aspiration        205 non-null    object
 5   doornumber        205 non-null    object
 6   carbody           205 non-null    object
 7   drivewheel        205 non-null    object
 8   enginelocation    205 non-null    object
 9   wheelbase         205 non-null    float64
 10  carlength         205 non-null    float64
 11  carwidth          205 non-null    float64
 12  carheight         205 non-null    float64
 13  curbweight        205 non-null    int64
 14  enginetype        205 non-null    object
 15  cylindernumber    205 non-null    object
 16  enginesize        205 non-null    int64
 17  fuelsystem        205 non-null    object
 18  boreratio         205 non-null    float64
 19  stroke            205 non-null    float64
 20  compressionratio  205 non-null    float64
 21  horsepower        205 non-null    int64
 22  peakrpm           205 non-null    int64
 23  citympg           205 non-null    int64
 24  highwaympg        205 non-null    int64
 25  price             205 non-null    float64
dtypes: float64(8), int64(8), object(10)
memory usage: 41.8+ KB
```

In [62]:
```
1 print(car.describe())
```

```
           car_ID   symboling   wheelbase   carlength    carwidth   carheight
\
count  205.000000  205.000000  205.000000  205.000000  205.000000  205.000000
mean   103.000000    0.834146   98.756585  174.049268   65.907805   53.724878
std     59.322565    1.245307    6.021776   12.337289    2.145204    2.443522
min      1.000000   -2.000000   86.600000  141.100000   60.300000   47.800000
25%     52.000000    0.000000   94.500000  166.300000   64.100000   52.000000
50%    103.000000    1.000000   97.000000  173.200000   65.500000   54.100000
75%    154.000000    2.000000  102.400000  183.100000   66.900000   55.500000
max    205.000000    3.000000  120.900000  208.100000   72.300000   59.800000

        curbweight  enginesize   boreratio      stroke  compressionratio  \
count   205.000000  205.000000  205.000000  205.000000        205.000000
mean   2555.565854  126.907317    3.329756    3.255415         10.142537
std     520.680204   41.642693    0.270844    0.313597          3.972040
min    1488.000000   61.000000    2.540000    2.070000          7.000000
25%    2145.000000   97.000000    3.150000    3.110000          8.600000
50%    2414.000000  120.000000    3.310000    3.290000          9.000000
75%    2935.000000  141.000000    3.580000    3.410000          9.400000
max    4066.000000  326.000000    3.940000    4.170000         23.000000

       horsepower      peakrpm     citympg  highwaympg         price
count  205.000000   205.000000  205.000000  205.000000    205.000000
mean   104.117073  5125.121951   25.219512   30.751220  13276.710571
std     39.544167   476.985643    6.542142    6.886443   7988.852332
min     48.000000  4150.000000   13.000000   16.000000   5118.000000
25%     70.000000  4800.000000   19.000000   25.000000   7788.000000
50%     95.000000  5200.000000   24.000000   30.000000  10295.000000
75%    116.000000  5500.000000   30.000000   34.000000  16503.000000
max    288.000000  6600.000000   49.000000   54.000000  45400.000000
```

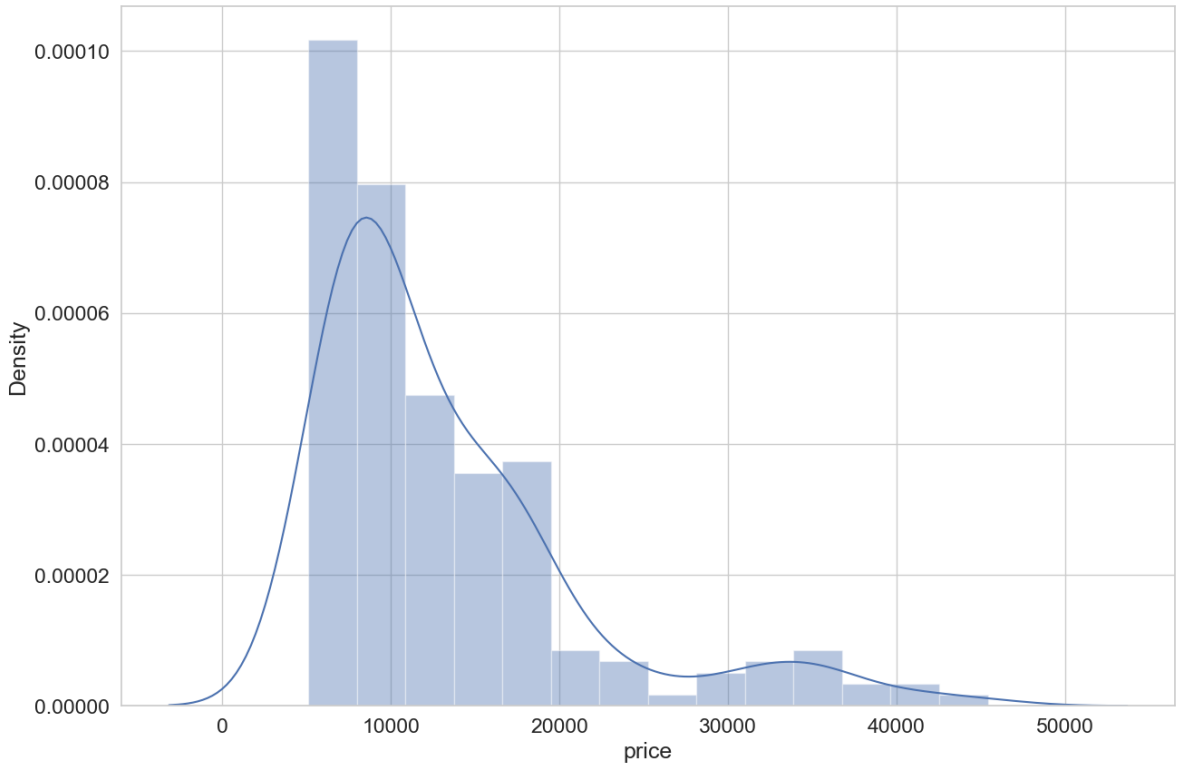
In [63]:
```
1 car.CarName.unique()
```

Out[63]:
```
array(['alfa-romero giulia', 'alfa-romero stelvio',
       'alfa-romero Quadrifoglio', 'audi 100 ls', 'audi 100ls',
       'audi fox', 'audi 5000', 'audi 4000', 'audi 5000s (diesel)',
       'bmw 320i', 'bmw x1', 'bmw x3', 'bmw z4', 'bmw x4', 'bmw x5',
       'chevrolet impala', 'chevrolet monte carlo', 'chevrolet vega 2300',
       'dodge rampage', 'dodge challenger se', 'dodge d200',
       'dodge monaco (sw)', 'dodge colt hardtop', 'dodge colt (sw)',
       'dodge coronet custom', 'dodge dart custom',
       'dodge coronet custom (sw)', 'honda civic', 'honda civic cvcc',
       'honda accord cvcc', 'honda accord lx', 'honda civic 1500 gl',
       'honda accord', 'honda civic 1300', 'honda prelude',
       'honda civic (auto)', 'isuzu MU-X', 'isuzu D-Max ',
       'isuzu D-Max V-Cross', 'jaguar xj', 'jaguar xf', 'jaguar xk',
       'maxda rx3', 'maxda glc deluxe', 'mazda rx2 coupe', 'mazda rx-4',
       'mazda glc deluxe', 'mazda 626', 'mazda glc', 'mazda rx-7 gs',
       'mazda glc 4', 'mazda glc custom l', 'mazda glc custom',
       'buick electra 225 custom', 'buick century luxus (sw)',
       'buick century', 'buick skyhawk', 'buick opel isuzu deluxe',
       'buick skylark', 'buick century special',
       'buick regal sport coupe (turbo)', 'mercury cougar',
       'mitsubishi mirage', 'mitsubishi lancer', 'mitsubishi outlander',
       'mitsubishi g4', 'mitsubishi mirage g4', 'mitsubishi montero',
       'mitsubishi pajero', 'Nissan versa', 'nissan gt-r', 'nissan rogue',
       'nissan latio', 'nissan titan', 'nissan leaf', 'nissan juke',
       'nissan note', 'nissan clipper', 'nissan nv200', 'nissan dayz',
       'nissan fuga', 'nissan otti', 'nissan teana', 'nissan kicks',
       'peugeot 504', 'peugeot 304', 'peugeot 504 (sw)', 'peugeot 604sl',
       'peugeot 505s turbo diesel', 'plymouth fury iii',
       'plymouth cricket', 'plymouth satellite custom (sw)',
       'plymouth fury gran sedan', 'plymouth valiant', 'plymouth duster',
       'porsche macan', 'porcshce panamera', 'porsche cayenne',
       'porsche boxter', 'renault 12tl', 'renault 5 gtl', 'saab 99e',
       'saab 99le', 'saab 99gle', 'subaru', 'subaru dl', 'subaru brz',
       'subaru baja', 'subaru r1', 'subaru r2', 'subaru trezia',
       'subaru tribeca', 'toyota corona mark ii', 'toyota corona',
       'toyota corolla 1200', 'toyota corona hardtop',
       'toyota corolla 1600 (sw)', 'toyota carina', 'toyota mark ii',
       'toyota corolla', 'toyota corolla liftback',
       'toyota celica gt liftback', 'toyota corolla tercel',
       'toyota corona liftback', 'toyota starlet', 'toyota tercel',
       'toyota cressida', 'toyota celica gt', 'toyouta tercel',
       'vokswagen rabbit', 'volkswagen 1131 deluxe sedan',
       'volkswagen model 111', 'volkswagen type 3', 'volkswagen 411 (sw)',
       'volkswagen super beetle', 'volkswagen dasher', 'vw dasher',
       'vw rabbit', 'volkswagen rabbit', 'volkswagen rabbit custom',
       'volvo 145e (sw)', 'volvo 144ea', 'volvo 244dl', 'volvo 245',
       'volvo 264gl', 'volvo diesel', 'volvo 246'], dtype=object)
```

In [64]:

```
sns.set_style('whitegrid')
plt.figure(figsize=(15,10))
sns.distplot(car.price)
plt.show()
```

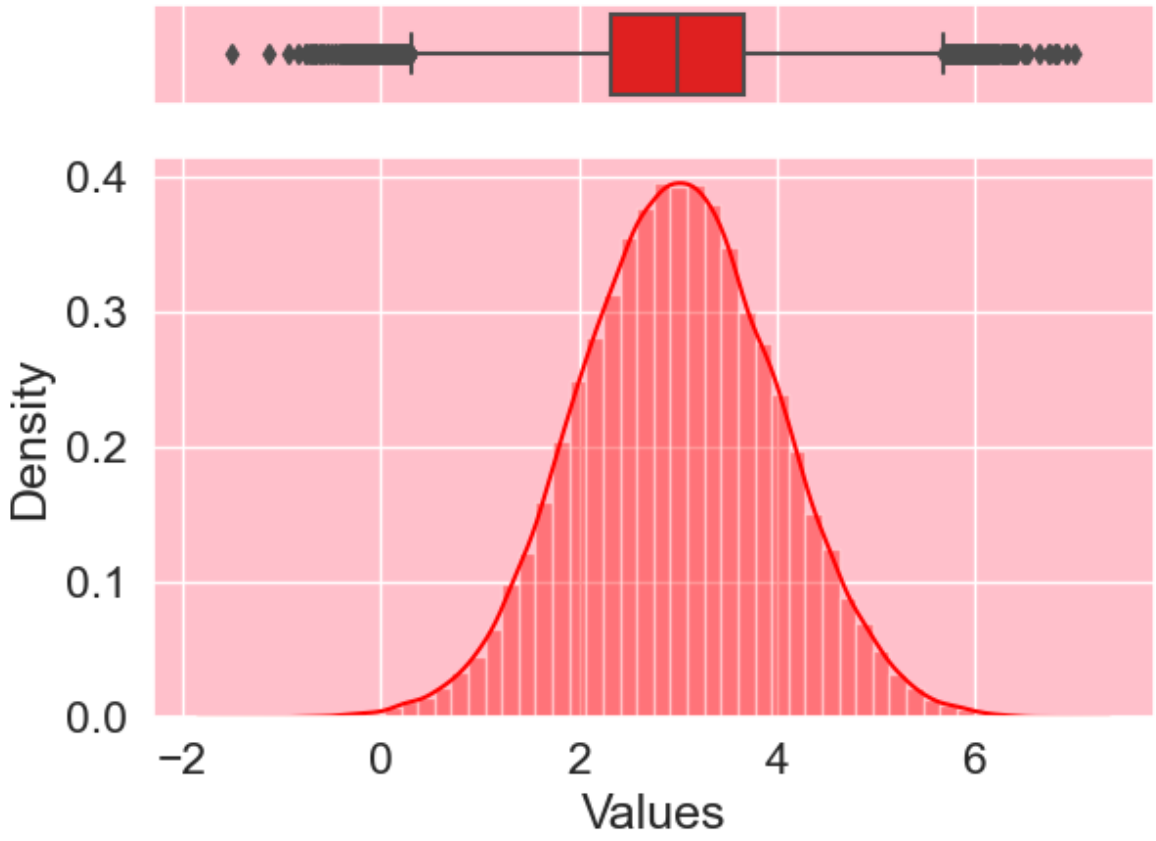
```
C:\Users\ANKIT MALL-PC\anaconda3\lib\site-packages\seaborn\distributions.py:2
619: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-
level function with similar flexibility) or `histplot` (an axes-level functio
n for histograms).
  warnings.warn(msg, FutureWarning)
```



In [65]:

```
values = np.random.normal(loc=3.0,scale=1.0,size=50000)
df_FLIM = pd.DataFrame(values, columns=['Values'])
sns.set(font_scale=1.5, rc={'axes.facecolor':'pink','figure.facecolor':'wh
f, (ax_box, ax_hist) = plt.subplots(2, sharex=True, gridspec_kw={"height_r
sns.boxplot(df_FLIM["Values"], ax=ax_box, color='red')
sns.distplot(df_FLIM["Values"], ax=ax_hist, color='red')
ax_box.set(xlabel='')
plt.tight_layout()
plt.show()
```

```
C:\Users\ANKIT MALL-PC\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other ar
guments without an explicit keyword will result in an error or misinterpretat
ion.
  warnings.warn(
C:\Users\ANKIT MALL-PC\anaconda3\lib\site-packages\seaborn\distributions.py:2
619: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-
level function with similar flexibility) or `histplot` (an axes-level functio
n for histograms).
  warnings.warn(msg, FutureWarning)
```



In [52]:

```
1 print(car.corr())
```

	car_ID	symboling	wheelbase	carlength	carwidth
car_ID	1.000000	-0.151621	0.129729	0.170636	0.052387
symboling	-0.151621	1.000000	-0.531954	-0.357612	-0.232919
wheelbase	0.129729	-0.531954	1.000000	0.874587	0.795144
carlength	0.170636	-0.357612	0.874587	1.000000	0.841118
carwidth	0.052387	-0.232919	0.795144	0.841118	1.000000
carheight	0.255960	-0.541038	0.589435	0.491029	0.279210
curbweight	0.071962	-0.227691	0.776386	0.877728	0.867032
enginesize	-0.033930	-0.105790	0.569329	0.683360	0.735433
boreratio	0.260064	-0.130051	0.488750	0.606454	0.559150
stroke	-0.160824	-0.008735	0.160959	0.129533	0.182942
compressionratio	0.150276	-0.178515	0.249786	0.158414	0.181129
horsepower	-0.015006	0.070873	0.353294	0.552623	0.640732
peakrpm	-0.203789	0.273606	-0.360469	-0.287242	-0.220012
citympg	0.015940	-0.035823	-0.470414	-0.670909	-0.642704
highwaympg	0.011255	0.034606	-0.544082	-0.704662	-0.677218
price	-0.109093	-0.079978	0.577816	0.682920	0.759325

	carheight	curbweight	enginesize	boreratio	stroke
car_ID	0.255960	0.071962	-0.033930	0.260064	-0.160824
symboling	-0.541038	-0.227691	-0.105790	-0.130051	-0.008735
wheelbase	0.589435	0.776386	0.569329	0.488750	0.160959
carlength	0.491029	0.877728	0.683360	0.606454	0.129533
carwidth	0.279210	0.867032	0.735433	0.559150	0.182942
carheight	1.000000	0.295572	0.067149	0.171071	-0.055307
curbweight	0.295572	1.000000	0.850594	0.648480	0.168790
enginesize	0.067149	0.850594	1.000000	0.583774	0.203129
boreratio	0.171071	0.648480	0.583774	1.000000	-0.055909
stroke	-0.055307	0.168790	0.203129	-0.055909	1.000000
compressionratio	0.261214	0.151362	0.028971	0.005197	0.186110
horsepower	-0.108802	0.750739	0.809769	0.573677	0.080940
peakrpm	-0.320411	-0.266243	-0.244660	-0.254976	-0.067964
citympg	-0.048640	-0.757414	-0.653658	-0.584532	-0.042145
highwaympg	-0.107358	-0.797465	-0.677470	-0.587012	-0.043931
price	0.119336	0.835305	0.874145	0.553173	0.079443

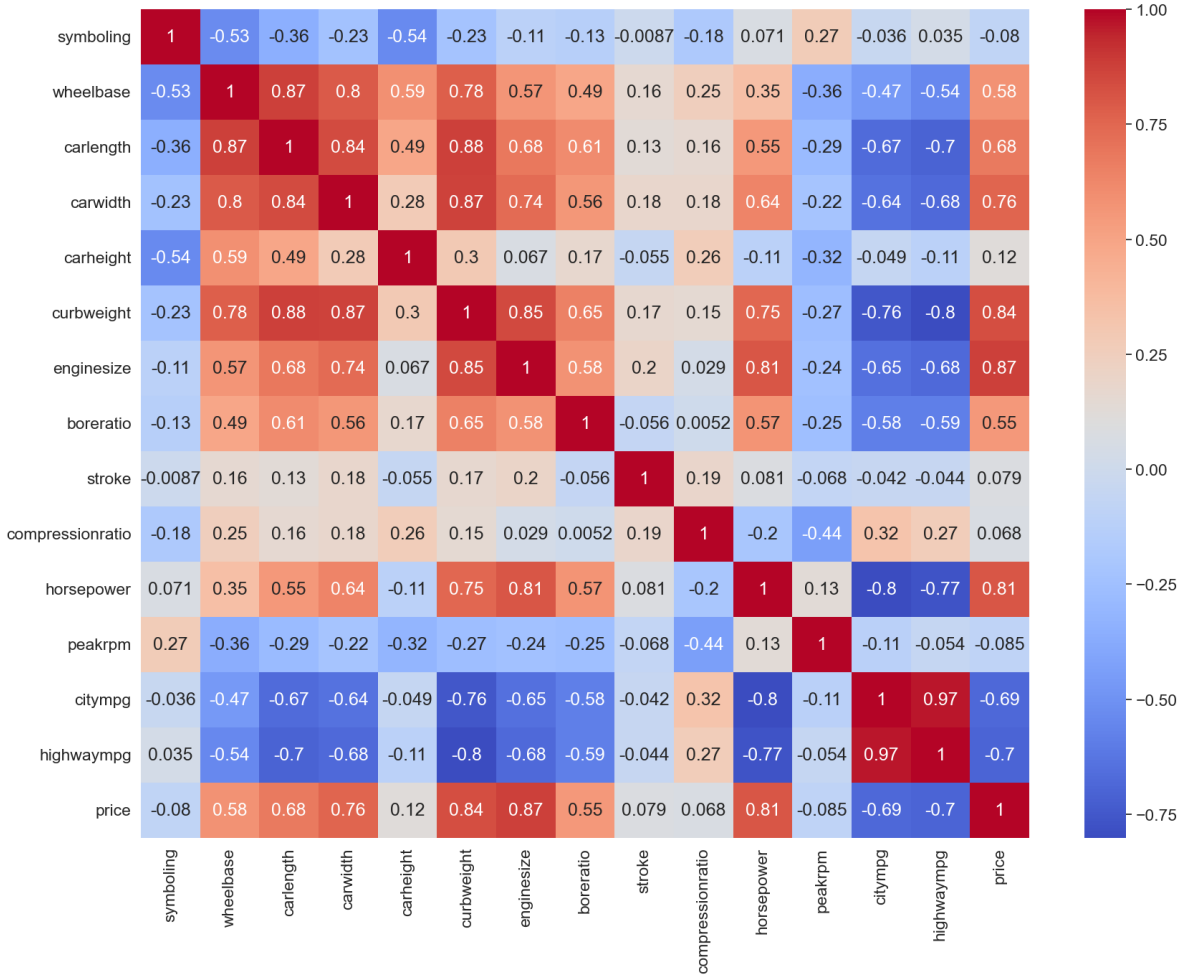
	compressionratio	horsepower	peakrpm	citympg
car_ID	0.150276	-0.015006	-0.203789	0.015940
symboling	-0.178515	0.070873	0.273606	-0.035823
wheelbase	0.249786	0.353294	-0.360469	-0.470414
carlength	0.158414	0.552623	-0.287242	-0.670909
carwidth	0.181129	0.640732	-0.220012	-0.642704
carheight	0.261214	-0.108802	-0.320411	-0.048640
curbweight	0.151362	0.750739	-0.266243	-0.757414
enginesize	0.028971	0.809769	-0.244660	-0.653658
boreratio	0.005197	0.573677	-0.254976	-0.584532
stroke	0.186110	0.080940	-0.067964	-0.042145
compressionratio	1.000000	-0.204326	-0.435741	0.324701
horsepower	-0.204326	1.000000	0.131073	-0.801456
peakrpm	-0.435741	0.131073	1.000000	-0.113544
citympg	0.324701	-0.801456	-0.113544	1.000000
highwaympg	0.265201	-0.770544	-0.054275	0.971337
price	0.067984	0.808139	-0.085267	-0.685751

	highwaympg	price
car_ID	0.011255	-0.109093
symboling	0.034606	-0.079978

```
wheelbase          -0.544082  0.577816
carlength          -0.704662  0.682920
carwidth           -0.677218  0.759325
carheight          -0.107358  0.119336
curbweight         -0.797465  0.835305
enginesize         -0.677470  0.874145
boreratio          -0.587012  0.553173
stroke             -0.043931  0.079443
compressionratio    0.265201  0.067984
horsepower         -0.770544  0.808139
peakrpm            -0.054275 -0.085267
citympg             0.971337 -0.685751
highwaympg          1.000000 -0.697599
price              -0.697599  1.000000
```

In [27]:

```
plt.figure(figsize=(20,15))
correlations=car.corr()
sns.heatmap(correlations,cmap='coolwarm' ,annot=True)
plt.show()
```



In [28]:

```
#training a car price prediction model
# i will use the decision tree regression algorithm to train a car price p
# So let's split the data into training and test sets and use thedecision
```

In [29]:
```
# price is target variable
predict='price'
car=car[['symboling','wheelbase','carlength',
           'carwidth','carheight','curbweight',
           'enginesize','boreratio','stroke',
           'compressionratio','horsepower','peakrpm',
           'citympg','highwaympg','price']]
x=np.array(car.drop([predict],1))
y=np.array(car['price'])
```

```
C:\Users\ANKIT MALL-PC\AppData\Local\Temp\ipykernel_5724\1620007685.py:8: Fut
ureWarning: In a future version of pandas all arguments of DataFrame.drop exc
ept for the argument 'labels' will be keyword-only.
  x=np.array(car.drop([predict],1))
```

In [30]:
```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train,y_test=train_test_split(x,y,train_size=0.8)

```

In [31]:
```
from sklearn.tree import DecisionTreeRegressor
model=DecisionTreeRegressor()

```

In [32]:
```
model.fit(x_train,y_train)
predictions=model.predict(x_test)
```

In [33]:
```
from sklearn.metrics import mean_absolute_error
model.score(x_test,predictions)
```

Out[33]:
```
1.0
```

In [ ]:
```

```

In [ ]:
```

```