EDA Basics

0.1 Deleting rows and columns from a dataframe

[1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
```

[2]:
```
# reading an excel file
orders =pd.read_excel('Superstore_Sales.xls')
```

[3]:
```
#viewing the top 5 records
orders.head()
```

[3]:

	Row ID	Order ID	Order Date	Order Priority	Order Quantity	Sales	\
0	1	3	2010-10-13	Low	6	261.5400	
1	2	6	2012-02-20	Not Specified	2	6.9300	
2	3	32	2011-07-15	High	26	2808.0800	
3	4	32	2011-07-15	High	24	1761.4000	
4	5	32	2011-07-15	High	23	160.2335	

	Discount	Ship Mode	Profit	Unit Price	…	Customer Name	\
0	0.04	Regular Air	-213.250	38.94	…	Muhammed MacIntyre	
1	0.01	Regular Air	-4.640	2.08	…	Ruben Dartt	
2	0.07	Regular Air	1054.820	107.53	…	Liz Pelletier	
3	0.09	Delivery Truck	-1748.560	70.89	…	Liz Pelletier	
4	0.04	Regular Air	-85.129	7.99	…	Liz Pelletier	

	Province	Region	Customer Segment	Product Category	\
0	Nunavut	Nunavut	Small Business	Office Supplies	
1	Alberta	West	Corporate	Office Supplies	
2	Alberta	West	Corporate	Furniture	
3	Alberta	West	Corporate	Furniture	
4	Alberta	West	Corporate	Technology	

	Product Sub-Category	\
0	Storage & Organization	
1	Scissors, Rulers and Trimmers	
2	Office Furnishings	

```
3                         Tables
4   Telephones and Communication

                                        Product Name Product Container  \
0   Eldon Base for stackable storage shelf, platinum         Large Box
1  Kleencut® Forged Office Shears by Acme United …        Small Pack
2  Tenex Contemporary Contur Chairmats for Low an…        Medium Box
3                              KI Conference Tables         Jumbo Box
4                      Bell Sonecor JB700 Caller ID        Medium Box

  Product Base Margin  Ship Date
0                0.80 2010-10-20
1                0.55 2012-02-21
2                0.65 2011-07-17
3                0.72 2011-07-16
4                0.60 2011-07-17

[5 rows x 21 columns]
```

[4]:
```
# Dropping the Row ID column (axis=1 for column)
orders.drop('Row ID',axis=1,inplace=True)
```

[5]:
```
#viewing the top 5 records after dropping the Row ID column
orders.head()
```

[5]:
```
   Order ID Order Date Order Priority  Order Quantity      Sales  Discount  \
0         3 2010-10-13            Low               6   261.5400      0.04
1         6 2012-02-20  Not Specified               2     6.9300      0.01
2        32 2011-07-15           High              26  2808.0800      0.07
3        32 2011-07-15           High              24  1761.4000      0.09
4        32 2011-07-15           High              23   160.2335      0.04

        Ship Mode    Profit  Unit Price  Shipping Cost       Customer Name  \
0     Regular Air  -213.250       38.94          35.00  Muhammed MacIntyre
1     Regular Air    -4.640        2.08           2.56         Ruben Dartt
2     Regular Air  1054.820      107.53           5.81       Liz Pelletier
3  Delivery Truck -1748.560       70.89          89.30       Liz Pelletier
4     Regular Air   -85.129        7.99           5.03       Liz Pelletier

  Province   Region Customer Segment Product Category  \
0  Nunavut  Nunavut   Small Business  Office Supplies
1  Alberta     West        Corporate  Office Supplies
2  Alberta     West        Corporate        Furniture
3  Alberta     West        Corporate        Furniture
4  Alberta     West        Corporate       Technology

            Product Sub-Category  \
```

```
0         Storage & Organization
1  Scissors, Rulers and Trimmers
2             Office Furnishings
3                         Tables
4   Telephones and Communication

                                      Product Name Product Container  \
0   Eldon Base for stackable storage shelf, platinum         Large Box
1  Kleencut® Forged Office Shears by Acme United …        Small Pack
2  Tenex Contemporary Contur Chairmats for Low an…        Medium Box
3                              KI Conference Tables         Jumbo Box
4                      Bell Sonecor JB700 Caller ID        Medium Box

   Product Base Margin  Ship Date
0                 0.80 2010-10-20
1                 0.55 2012-02-21
2                 0.65 2011-07-17
3                 0.72 2011-07-16
4                 0.60 2011-07-17
```

[6]:
```
# Dropping the multiple columns togethor
orders.drop(['Order Date','Order Priority'],axis=1,inplace=True)
```

[7]:
```
orders.head()
```

[7]:
```
   Order ID  Order Quantity      Sales  Discount       Ship Mode    Profit  \
0         3               6   261.5400      0.04     Regular Air  -213.250
1         6               2     6.9300      0.01     Regular Air    -4.640
2        32              26  2808.0800      0.07     Regular Air  1054.820
3        32              24  1761.4000      0.09  Delivery Truck -1748.560
4        32              23   160.2335      0.04     Regular Air   -85.129

   Unit Price  Shipping Cost       Customer Name Province   Region  \
0       38.94          35.00  Muhammed MacIntyre  Nunavut  Nunavut
1        2.08           2.56         Ruben Dartt  Alberta     West
2      107.53           5.81       Liz Pelletier  Alberta     West
3       70.89          89.30       Liz Pelletier  Alberta     West
4        7.99           5.03       Liz Pelletier  Alberta     West

  Customer Segment Product Category           Product Sub-Category  \
0   Small Business  Office Supplies         Storage & Organization
1        Corporate  Office Supplies  Scissors, Rulers and Trimmers
2        Corporate        Furniture             Office Furnishings
3        Corporate        Furniture                         Tables
4        Corporate       Technology   Telephones and Communication

                                      Product Name Product Container  \
```

```
0   Eldon Base for stackable storage shelf, platinum        Large Box
1  Kleencut® Forged Office Shears by Acme United …       Small Pack
2  Tenex Contemporary Contur Chairmats for Low an…       Medium Box
3                              KI Conference Tables         Jumbo Box
4                    Bell Sonecor JB700 Caller ID       Medium Box

   Product Base Margin  Ship Date
0                 0.80 2010-10-20
1                 0.55 2012-02-21
2                 0.65 2011-07-17
3                 0.72 2011-07-16
4                 0.60 2011-07-17
```

[8]:
```
# Drop Rows (axis=0 for rows)
orders.drop(1,axis=0,inplace=True)
```

[9]:
```
orders.head()
```

[9]:
```
   Order ID  Order Quantity      Sales  Discount       Ship Mode    Profit  \
0         3               6   261.5400      0.04     Regular Air  -213.250
2        32              26  2808.0800      0.07     Regular Air  1054.820
3        32              24  1761.4000      0.09  Delivery Truck -1748.560
4        32              23   160.2335      0.04     Regular Air   -85.129
5        32              15   140.5600      0.04     Regular Air  -128.380

   Unit Price  Shipping Cost       Customer Name     Province   Region  \
0       38.94          35.00  Muhammed MacIntyre      Nunavut  Nunavut
2      107.53           5.81       Liz Pelletier      Alberta     West
3       70.89          89.30       Liz Pelletier      Alberta     West
4        7.99           5.03       Liz Pelletier      Alberta     West
5        8.46           8.99       Liz Pelletier  Saskachewan   Prarie

  Customer Segment Product Category          Product Sub-Category  \
0   Small Business  Office Supplies        Storage & Organization
2        Corporate        Furniture            Office Furnishings
3        Corporate        Furniture                        Tables
4        Corporate       Technology  Telephones and Communication
5        Corporate       Technology          Computer Peripherals

                                      Product Name Product Container  \
0   Eldon Base for stackable storage shelf, platinum        Large Box
2  Tenex Contemporary Contur Chairmats for Low an…       Medium Box
3                              KI Conference Tables         Jumbo Box
4                    Bell Sonecor JB700 Caller ID       Medium Box
5                  Imation 3.5 IBM Diskettes, 10/Box       Small Pack

   Product Base Margin  Ship Date
```

```
0                 0.80 2010-10-20
2                 0.65 2011-07-17
3                 0.72 2011-07-16
4                 0.60 2011-07-17
5                 0.79 2011-07-16
```

[10]:
```
# Dropping Multiple Rows
orders.drop([2,3],axis =0,inplace=True)
```

[11]:
```
orders.head()
```

[11]:
```
   Order ID  Order Quantity      Sales  Discount    Ship Mode   Profit  \
0         3               6   261.5400      0.04  Regular Air -213.250
4        32              23   160.2335      0.04  Regular Air  -85.129
5        32              15   140.5600      0.04  Regular Air -128.380
6        35              30   288.5600      0.03  Regular Air   60.720
7        35              14  1892.8480      0.01  Regular Air   48.987

   Unit Price  Shipping Cost       Customer Name          Province   Region  \
0       38.94          35.00  Muhammed MacIntyre           Nunavut  Nunavut
4        7.99           5.03       Liz Pelletier           Alberta     West
5        8.46           8.99       Liz Pelletier      Saskachewan   Prarie
6        9.11           2.25     Julie Creighton  British Columbia     West
7      155.99           8.99     Julie Creighton  British Columbia     West

  Customer Segment Product Category          Product Sub-Category  \
0   Small Business  Office Supplies        Storage & Organization
4        Corporate       Technology  Telephones and Communication
5        Corporate       Technology          Computer Peripherals
6        Corporate  Office Supplies           Pens & Art Supplies
7        Corporate       Technology  Telephones and Communication

                                      Product Name Product Container  \
0  Eldon Base for stackable storage shelf, platinum        Large Box
4                      Bell Sonecor JB700 Caller ID       Medium Box
5                 Imation 3.5 IBM Diskettes, 10/Box       Small Pack
6       Dixon Ticonderoga Core-Lock Colored Pencils         Wrap Bag
7                                           CF 688        Small Box

   Product Base Margin  Ship Date
0                 0.80 2010-10-20
4                 0.60 2011-07-17
5                 0.79 2011-07-16
6                 0.52 2011-10-23
7                 0.58 2011-10-24
```

1 Duplicate Values

[12]:
```
raw_data = {
    "city":␣
 ↪["Faridabad","Delhi","Faridabad","Noida","Noida","Faridabad","Noida","Delhi","Delhi"],
    "rank": ["1st","2nd","1st","2nd","1st","2nd","1st","2nd","1st"],
    "score1":[44,48,39,41,38,44,38,53,61],
    "score2":[67,63,55,70,64,77,45,66,72]
}

df=pd.DataFrame(raw_data,columns=["city","rank","score1","score2"])
df
```

[12]:

	city	rank	score1	score2
0	Faridabad	1st	44	67
1	Delhi	2nd	48	63
2	Faridabad	1st	39	55
3	Noida	2nd	41	70
4	Noida	1st	38	64
5	Faridabad	2nd	44	77
6	Noida	1st	38	45
7	Delhi	2nd	53	66
8	Delhi	1st	61	72

[13]:
```
#check for duplicate data
df.duplicated()

# So, thereisno duplicate row in a dataframe
```

[13]:
```
0    False
1    False
2    False
3    False
4    False
5    False
6    False
7    False
8    False
dtype: bool
```

[14]:
```
#check for duplicate rows in city
df.duplicated(['city'])

#the first occurrences of data also treated as False
```

[14]:
```
0    False
1    False
```

```
2     True
3    False
4     True
5     True
6     True
7     True
8     True
dtype: bool
```

[15]:
```
df.duplicated(['rank'])
#the first occurrences of data also treated as False
```

[15]:
```
0    False
1    False
2     True
3     True
4     True
5     True
6     True
7     True
8     True
dtype: bool
```

[16]:
```
df.duplicated(['rank'],keep='last')
# the last occurances is treated as True, when we classify keep as last
```

[16]:
```
0     True
1     True
2     True
3     True
4     True
5     True
6     True
7    False
8    False
dtype: bool
```

[17]:
```
#checking duplicate values on the basis of combinations
df.duplicated(['city','rank'])
```

[17]:
```
0    False
1    False
2     True
3    False
4    False
5    False
6     True
```

```
7     True
8    False
dtype: bool
```

[18]:
```
df.drop_duplicates()
# No rows are dropped because there is no duplicate rows
```

[18]:
```
        city rank  score1  score2
0  Faridabad  1st      44      67
1      Delhi  2nd      48      63
2  Faridabad  1st      39      55
3      Noida  2nd      41      70
4      Noida  1st      38      64
5  Faridabad  2nd      44      77
6      Noida  1st      38      45
7      Delhi  2nd      53      66
8      Delhi  1st      61      72
```

[19]:
```
df.drop_duplicates(['city'])
#all the duplicate cities are dropped
```

[19]:
```
        city rank  score1  score2
0  Faridabad  1st      44      67
1      Delhi  2nd      48      63
3      Noida  2nd      41      70
```

[20]:
```
df.drop_duplicates(['city','rank'])
# all the duplicate rows are dropped on the basis of combination of city and␣
 ↪rank column
```

[20]:
```
        city rank  score1  score2
0  Faridabad  1st      44      67
1      Delhi  2nd      48      63
3      Noida  2nd      41      70
4      Noida  1st      38      64
5  Faridabad  2nd      44      77
8      Delhi  1st      61      72
```

[21]:
```
orders.describe()
```

[21]:
```
           Order ID  Order Quantity        Sales     Discount        Profit  \
count   8396.000000     8396.000000   8396.000000  8396.000000   8396.000000
mean   29975.878394       25.574678   1775.967653     0.049669    181.332342
std    17254.682794       14.481362   3585.621358     0.031822   1196.642082
min        3.000000        1.000000      2.240000     0.000000 -14140.701600
25%    15033.750000       13.000000    143.242500     0.020000    -83.307500
50%    29860.500000       26.000000    449.295000     0.050000     -1.495000
```

```
75%    44609.000000       38.000000   1705.432500      0.080000    162.707000
max    59973.000000       50.000000  89061.050000      0.250000  27220.690000
```

```
        Unit Price  Shipping Cost  Product Base Margin
count  8396.000000    8396.000000          8333.000000
mean     89.356685      12.831511             0.512467
std     290.404559      17.246422             0.135585
min       0.990000       0.490000             0.350000
25%       6.480000       3.300000             0.380000
50%      20.990000       6.070000             0.520000
75%      85.990000      13.990000             0.590000
max    6783.020000     164.730000             0.850000
```

1.1 What is an outlier ?

- A data point which is significantly far away from other data points
- IQR (Inter Quartile Range)
- IQR = Q3 - Q1
- Lower Boundary = Q1 - (1.5 * IQR)
- Upper Boundary = Q3 + (1.5 * IQR)

[22]:
```
data = pd.read_csv('house_prices.csv')
```

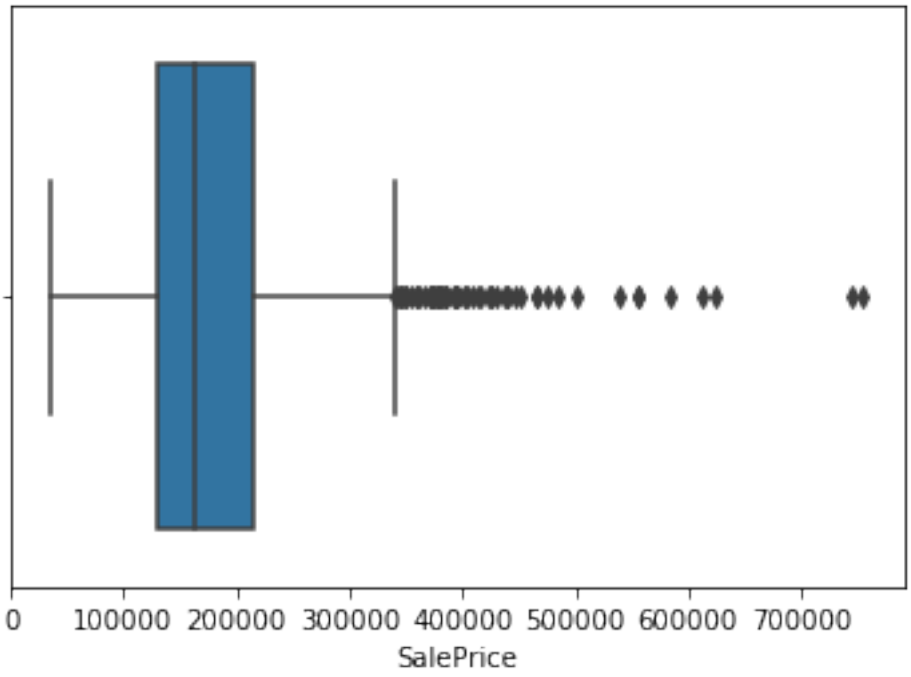
[23]:
```
data['SalePrice'].describe()
```

[23]:
```
count      1460.000000
mean     180921.195890
std       79442.502883
min       34900.000000
25%      129975.000000
50%      163000.000000
75%      214000.000000
max      755000.000000
Name: SalePrice, dtype: float64
```

[24]:
```
import seaborn as sns
```

[25]:
```
sns.boxplot(x=data['SalePrice'])
```

[25]:
```
<AxesSubplot:xlabel='SalePrice'>
```



[26]:
```
# Checking the shapeof the data
data.shape
```

[26]:
```
(1460, 81)
```

[27]:
```
# Let's calculate first quartile,third_quartile and inter_quartile range

first_quartile = data['SalePrice'].quantile(.25)
third_quartile = data['SalePrice'].quantile(.75)
IQR = third_quartile - first_quartile
```

[28]:
```
new_boundary = third_quartile + 3 * IQR
```

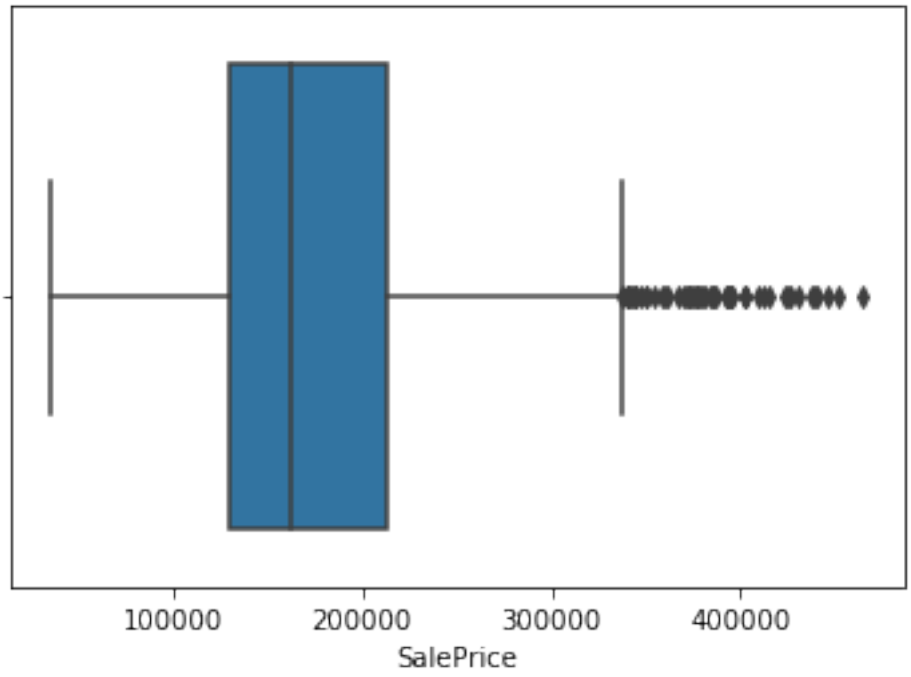
[29]:
```
# dropped the outliers data
new_data = data.drop(data[data['SalePrice']>new_boundary].index, axis = 0,␣
 ↪inplace=False)
```

[30]:
```
# 12 rows are dropped
new_data.shape
```

[30]:
```
(1448, 81)
```

[31]:
```
sns.boxplot(x=new_data['SalePrice'])
```

[31]:
```
<AxesSubplot:xlabel='SalePrice'>
```



1.2 Outliers detection using IQR

[32]:
```
# height of a persons
raw ={'name':
 ↪['mohan','maria','deepak','kunal','piyush','avinash','lisa','smita','tanu',
                 ␣
 ↪'khusboo','nishant','johnson','donald','rakesh','pritvi','roy','ashish','abhishek','jassi',
      'height':[1.2,2.3,4.9,5.1,5.2,5.4,5.5,5.5,5.6,5.6,5.8,5.9,6,6.1,6.2,6.5,7.
 ↪1,14.5,23.2,40.2]
     }
df =pd.DataFrame(raw)
```

[33]:
```
df
```

[33]:

	name	height
0	mohan	1.2
1	maria	2.3
2	deepak	4.9
3	kunal	5.1
4	piyush	5.2
5	avinash	5.4
6	lisa	5.5
7	smita	5.5
8	tanu	5.6

```
9    khusboo     5.6
10   nishant     5.8
11   johnson     5.9
12    donald     6.0
13    rakesh     6.1
14    pritvi     6.2
15       roy     6.5
16    ashish     7.1
17  abhishek    14.5
18     jassi    23.2
19    puneet    40.2
```

[34]:
```
df.describe()
```

[34]:
```
          height
count  20.000000
mean    8.390000
std     8.782812
min     1.200000
25%     5.350000
50%     5.700000
75%     6.275000
max    40.200000
```

[35]:
```
# Calculating the Q1 ,Q3
Q1 = df.height.quantile(.25)
Q3 = df.height.quantile(.75)
Q1 , Q3
```

[35]:
```
(5.3500000000000005, 6.275)
```

[36]:
```
# Calculating IQR
IQR = Q3 - Q1
IQR
```

[36]:
```
0.9249999999999998
```

[37]:
```
# Calculating IQR
lower_limit = Q1 - 1.5 * (IQR)
upper_limit = Q3 + 1.5 * (IQR)
lower_limit,upper_limit
```

[37]:
```
(3.962500000000001, 7.6625)
```

[38]:
```
#outliers
df[(df.height<lower_limit)|(df.height>upper_limit)]
```

[38]:
```
        name  height
0      mohan     1.2
1      maria     2.3
17  abhishek    14.5
18     jassi    23.2
19    puneet    40.2
```

[39]:
```
# data with no outliers
df_no_outliers = df[(df.height>lower_limit) & (df.height < upper_limit) ]
```

[40]:
```
df_no_outliers
```

[40]:
```
        name  height
2     deepak     4.9
3      kunal     5.1
4     piyush     5.2
5    avinash     5.4
6       lisa     5.5
7      smita     5.5
8       tanu     5.6
9    khusboo     5.6
10   nishant     5.8
11   johnson     5.9
12    donald     6.0
13    rakesh     6.1
14    pritvi     6.2
15       roy     6.5
16    ashish     7.1
```

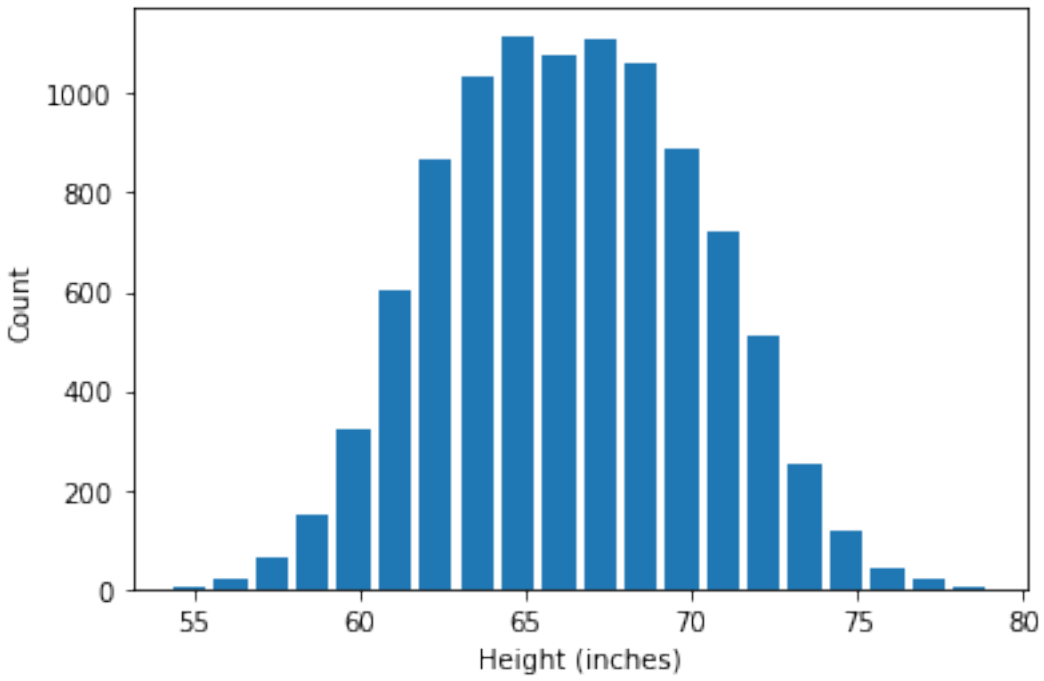
[ ]:
```

```

[41]:
```
df =pd.read_csv("heights.csv")
```

[42]:
```
df.sample(5)
```

[42]:
```
      Gender     Height
3346    Male  67.880407
5767  Female  60.503327
8271  Female  65.632600
5869  Female  62.243849
3701    Male  69.481714
```

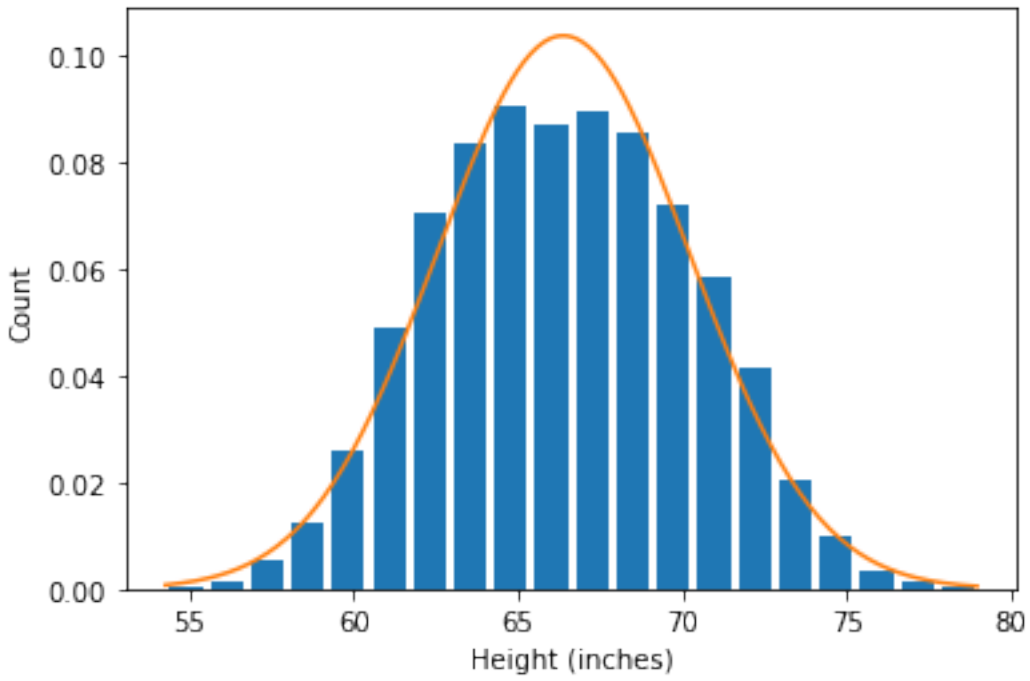
[43]:
```
plt.hist(df.Height,bins=20,rwidth=0.8)
plt.xlabel('Height (inches)')
plt.ylabel('Count')
plt.show()
```



Refer to https://www.mathsisfun.com/data/standard-normal-distribution.html for more details

[44]:
```
from scipy.stats import norm
import numpy as np

plt.hist(df.Height,bins=20,rwidth=0.8,density=True)
plt.xlabel('Height (inches)')
plt.ylabel('Count')

rng= np.arange(df.Height.min(),df.Height.max(),0.1)
plt.plot(rng,norm.pdf(rng,df.Height.mean(),df.Height.std()))
```

[44]:
```
[<matplotlib.lines.Line2D at 0x1b565155790>]
```



[45]:
```
#Calculating Mean
df.Height.mean()
```

[45]: 66.3675597548656

[46]:
```
#Calculating Standard Deviation
df.Height.std()
```

[46]: 3.847528120795573

[47]:
```
#Calculating upper_limit
upper_limit = df.Height.mean() + 3 * df.Height.std()
upper_limit
```

[47]: 77.91014411725232

[48]:
```
#Calculating lower_limit
lower_limit = df.Height.mean() - 3 * df.Height.std()
lower_limit
```

[48]: 54.824975392478876

[49]:
```
# checking the outliers
df[(df.Height>upper_limit )| (df.Height <lower_limit)]
```

[49]:
```
      Gender     Height
994     Male  78.095867
1317    Male  78.462053
2014    Male  78.998742
3285    Male  78.528210
3757    Male  78.621374
6624  Female  54.616858
9285  Female  54.263133
```

[50]:
```
df_no_outlier_std_dev = df[(df.Height<upper_limit ) & (df.Height >lower_limit)]
df_no_outlier_std_dev.shape
```

[50]:
```
(9993, 2)
```

[51]:
```
df.shape[0] - df_no_outlier_std_dev.shape[0]
```

[51]:
```
7
```

1.3 Outlier detection and removal using Z score

Z score indicates how many standard deviation away a datapoint is.

For example in our case mean is 66.37 and the standard deviation is 3.84

If a value of data point is 77.91, then Z score for that is 3 because it is 3 standard deviation away (77.91 = 66.37 + 3 * 3.84)

Score is refer to data point below

1.4 z = (x −) /

[52]:
```
df['zscore'] = (df.Height - df.Height.mean())/df.Height.std()
```

[53]:
```
df.head(5)
```

[53]:
```
  Gender     Height    zscore
0   Male  73.847017  1.943964
1   Male  68.781904  0.627505
2   Male  74.110105  2.012343
3   Male  71.730978  1.393991
4   Male  69.881796  0.913375
```

[54]:
```
#outliers
df[(df['zscore']>3) | (df['zscore']<-3)]
```

[54]:
```
      Gender     Height    zscore
994     Male  78.095867  3.048271
```

```
1317    Male  78.462053  3.143445
2014    Male  78.998742  3.282934
3285    Male  78.528210  3.160640
3757    Male  78.621374  3.184854
6624  Female  54.616858 -3.054091
9285  Female  54.263133 -3.146027
```

[55]:
```
#removing outliers as per Z score
df_no_outliers = df[(df.zscore <3) & (df.zscore > -3)]
df_no_outliers.head()
```

[55]:
```
  Gender     Height    zscore
0   Male  73.847017  1.943964
1   Male  68.781904  0.627505
2   Male  74.110105  2.012343
3   Male  71.730978  1.393991
4   Male  69.881796  0.913375
```

[56]:
```
#checkig the number of ouliers
df.shape[0] - df_no_outliers.shape[0]
```

[56]:
```
7
```

[57]:
```
#Load the Dataset
df = pd.read_csv('imdb_1000.csv')
```

[58]:
```
#preview of dataset
df.head()
```

[58]:
```
   star_rating                     title content_rating   genre  duration  \
0          9.3  The Shawshank Redemption              R   Crime       142
1          9.2             The Godfather              R   Crime       175
2          9.1    The Godfather: Part II              R   Crime       200
3          9.0           The Dark Knight          PG-13  Action       152
4          8.9              Pulp Fiction              R   Crime       154

                                        actors_list
0  [u'Tim Robbins', u'Morgan Freeman', u'Bob Gunt…
1    [u'Marlon Brando', u'Al Pacino', u'James Caan']
2  [u'Al Pacino', u'Robert De Niro', u'Robert Duv…
3  [u'Christian Bale', u'Heath Ledger', u'Aaron E…
4  [u'John Travolta', u'Uma Thurman', u'Samuel L…
```

[59]:
```
df['genre']
```

[59]:
```
0          Crime
1          Crime
```

```
2          Crime
3         Action
4          Crime
         …
974       Comedy
975    Adventure
976       Action
977       Horror
978        Crime
Name: genre, Length: 979, dtype: object
```

[60]:
```
from collections import Counter
```

[61]:
```
Counter(df.genre)
```

[61]:
```
Counter({'Crime': 124,
         'Action': 136,
         'Drama': 278,
         'Western': 9,
         'Adventure': 75,
         'Biography': 77,
         'Comedy': 156,
         'Animation': 62,
         'Mystery': 16,
         'Horror': 29,
         'Film-Noir': 3,
         'Sci-Fi': 5,
         'History': 1,
         'Thriller': 5,
         'Family': 2,
         'Fantasy': 1})
```

[62]:
```
# to get the frequency
df.genre.value_counts()
```

[62]:
```
Drama        278
Comedy       156
Action       136
Crime        124
Biography     77
Adventure     75
Animation     62
Horror        29
Mystery       16
Western        9
Sci-Fi         5
Thriller       5
```

```
Film-Noir      3
Family         2
History        1
Fantasy        1
Name: genre, dtype: int64
```

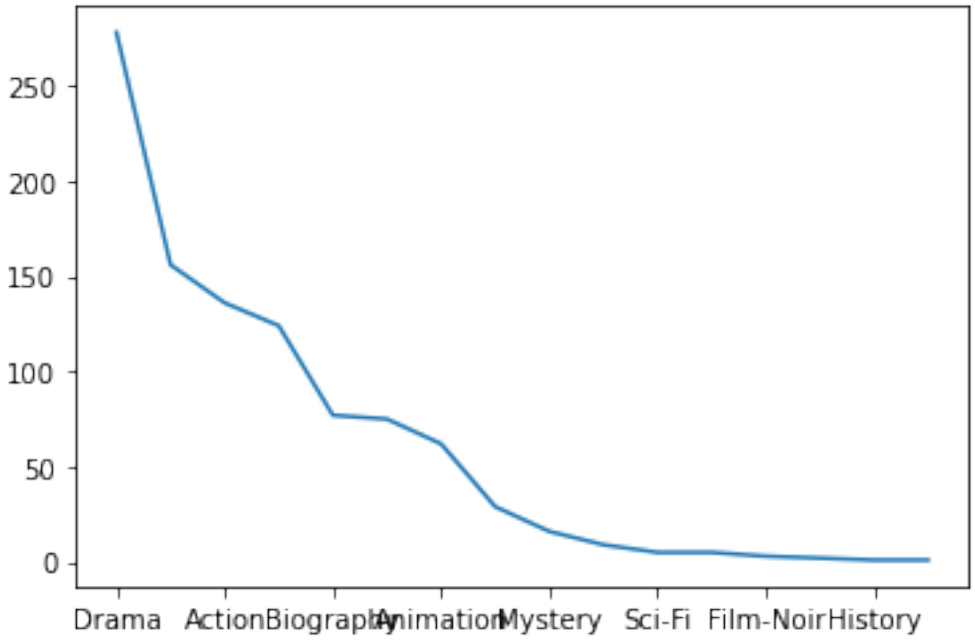
[63]:
```
#checking the type
type(df.genre.value_counts())
```

[63]:
```
pandas.core.series.Series
```

[64]:
```
gc = df['genre'].value_counts()
```

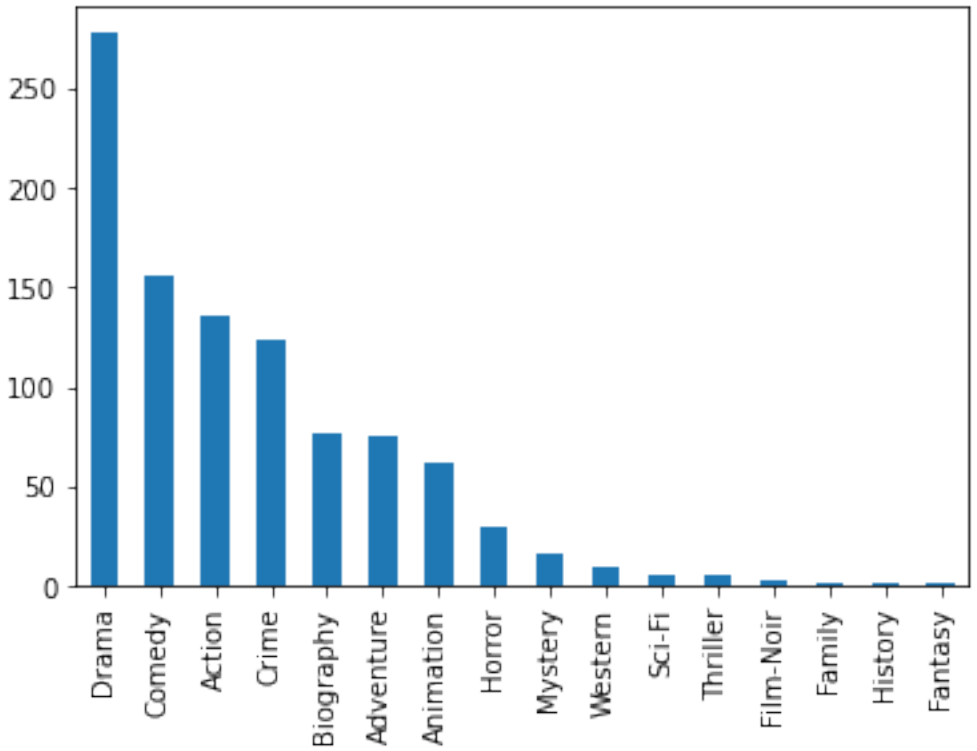
[65]:
```
gc.plot()
```

[65]:
```
<AxesSubplot:>
```



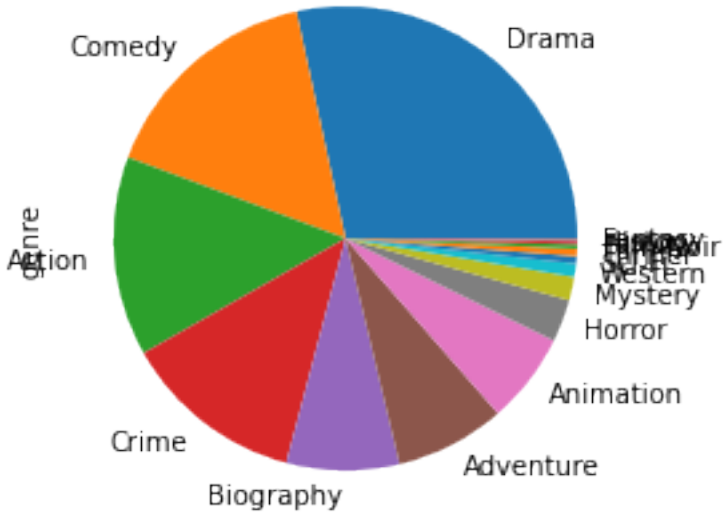
[66]:
```
#Visualizing through a bar chart
gc.plot(kind='bar')
```

[66]:
```
<AxesSubplot:>
```



[67]:
```
#Visualizing through pie chart
gc.plot(kind='pie')
```

[67]: <AxesSubplot:ylabel='genre'>



Refer to https://medium.com/analytics-vidhya/intro-to-univariate-analysis-de75454b4719 for more details

[68]:
```
titanic_df = pd.read_csv('titanic_df.csv')
```

[69]:
```
titanic_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    int64
 2   Pclass       891 non-null    int64
 3   Name         891 non-null    object
 4   Sex          891 non-null    object
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object
 11  Embarked     889 non-null    object
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

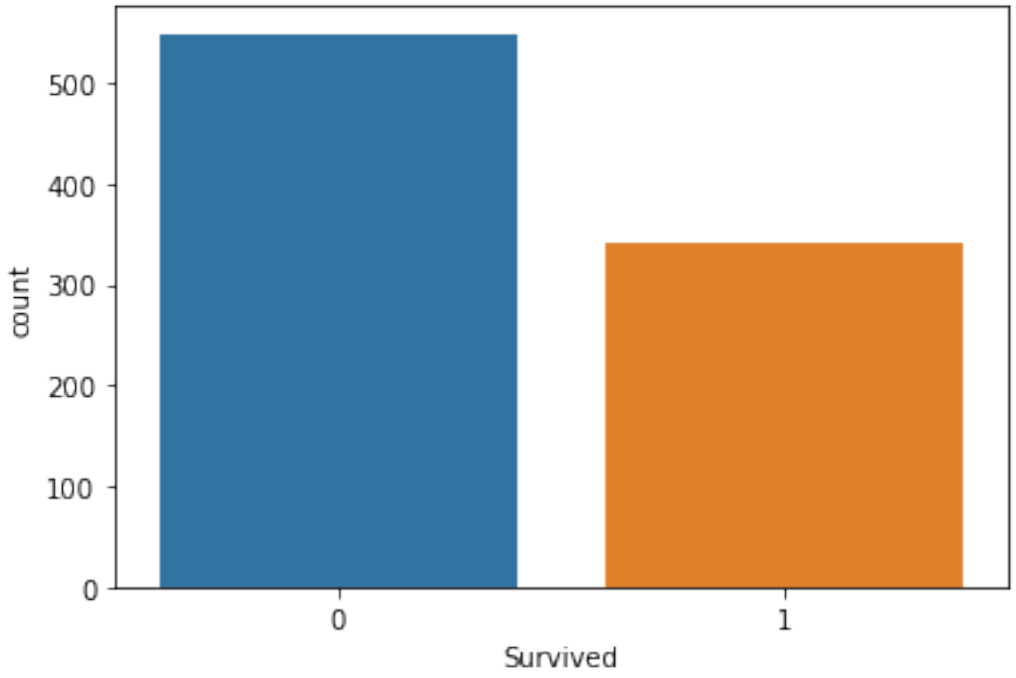
[70]:
```
#checking top 5 recordsof the dataset
titanic_df.head()
```

[70]:

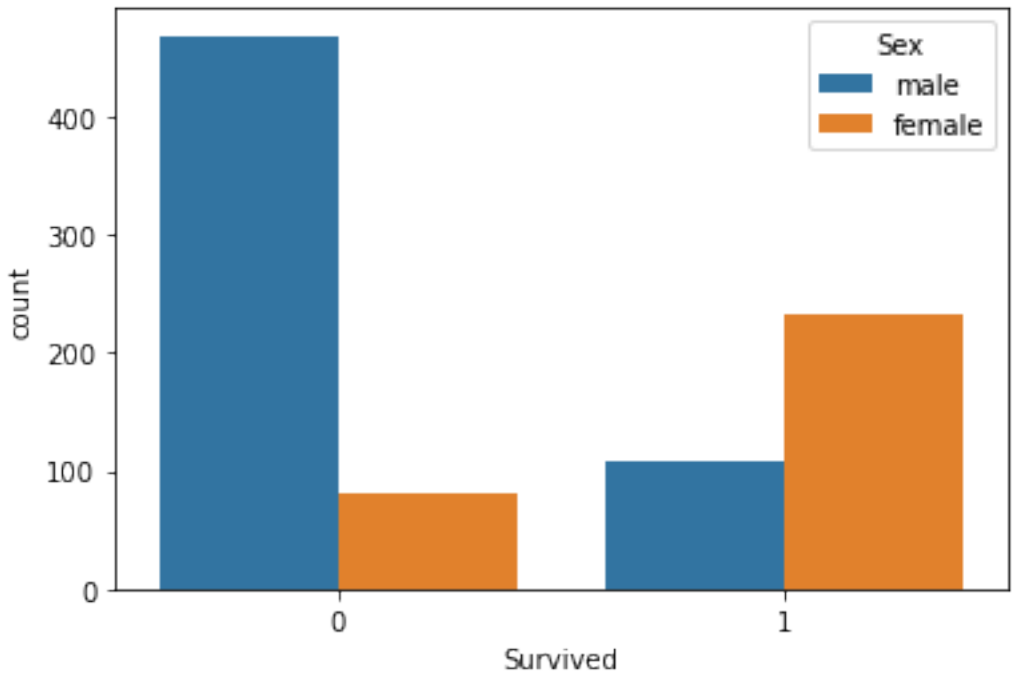
	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0				
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th…	female	38.0	1					
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0					
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1					
4	5	0	3	Allen, Mr. William Henry	male	35.0	0					

```
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

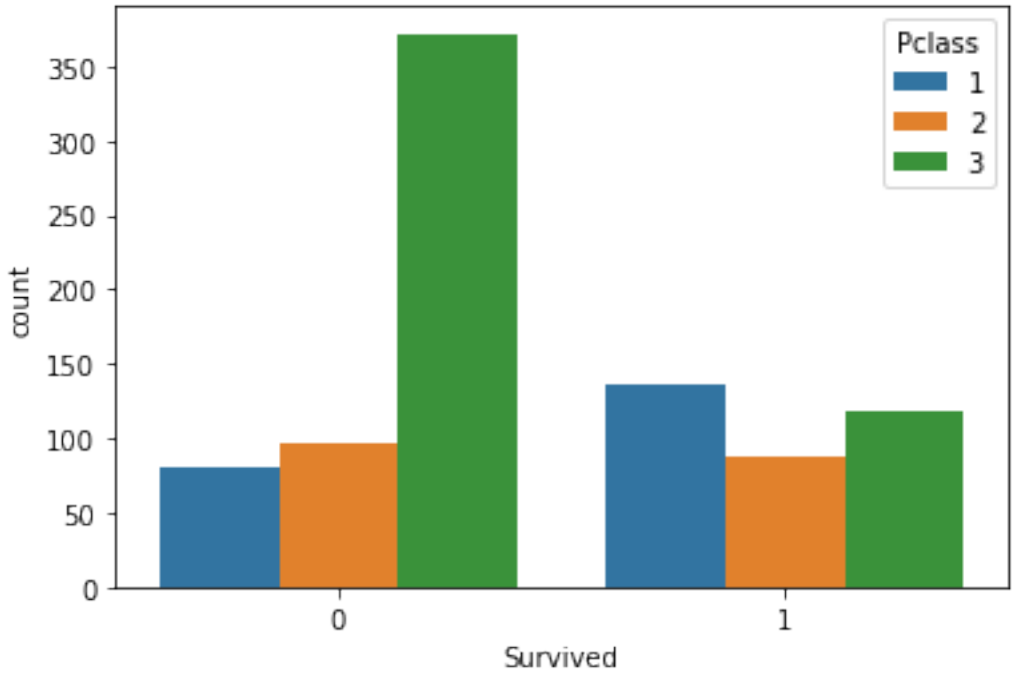
[71]:
```
#Let's visualize the survivors count
sns.countplot(x=titanic_df.Survived)
plt.show()
```



[72]:
```
# Lets check how many males and females were survived
sns.countplot(x=titanic_df.Survived,hue=titanic_df.Sex)
plt.show()
```



[73]:
```
# Let's distinguish the data by passenger class
sns.countplot(x=titanic_df.Survived,hue=titanic_df.Pclass)
plt.show()
```



1.4.1 Numerical Data

[74]:
```
tips_df = pd.read_csv('tips.csv')
```

[75]:
```
tips_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 244 entries, 0 to 243
Data columns (total 7 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   total_bill  244 non-null    float64
 1   tip         244 non-null    float64
 2   sex         244 non-null    object
 3   smoker      244 non-null    object
 4   day         244 non-null    object
 5   time        244 non-null    object
 6   size        244 non-null    int64
dtypes: float64(2), int64(1), object(4)
memory usage: 13.5+ KB
```

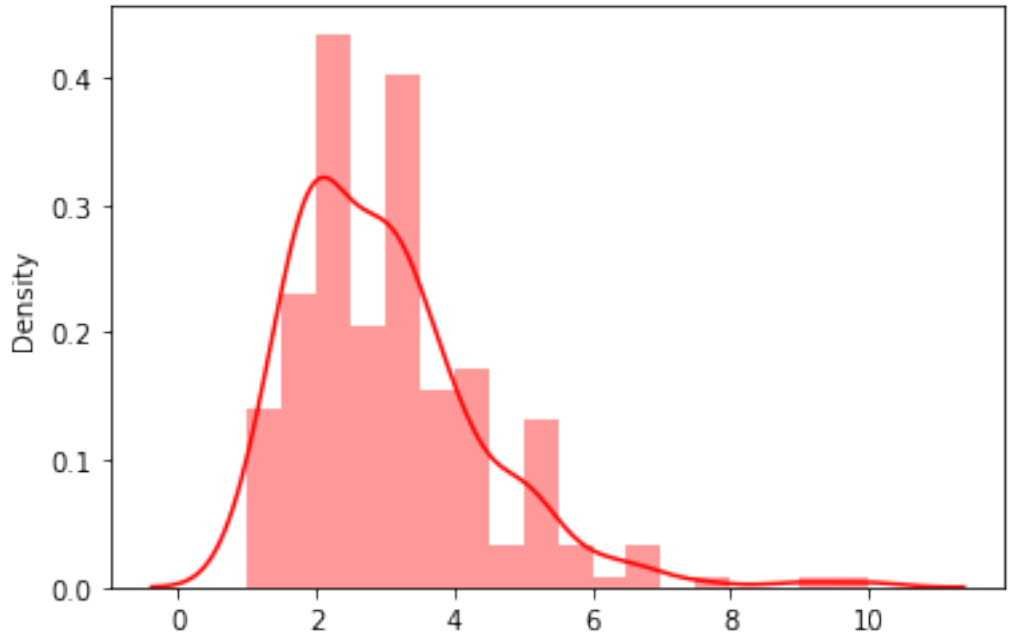
[76]:
```
#checking top 5 recordsof the dataset
tips_df.head()
```

[76]:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

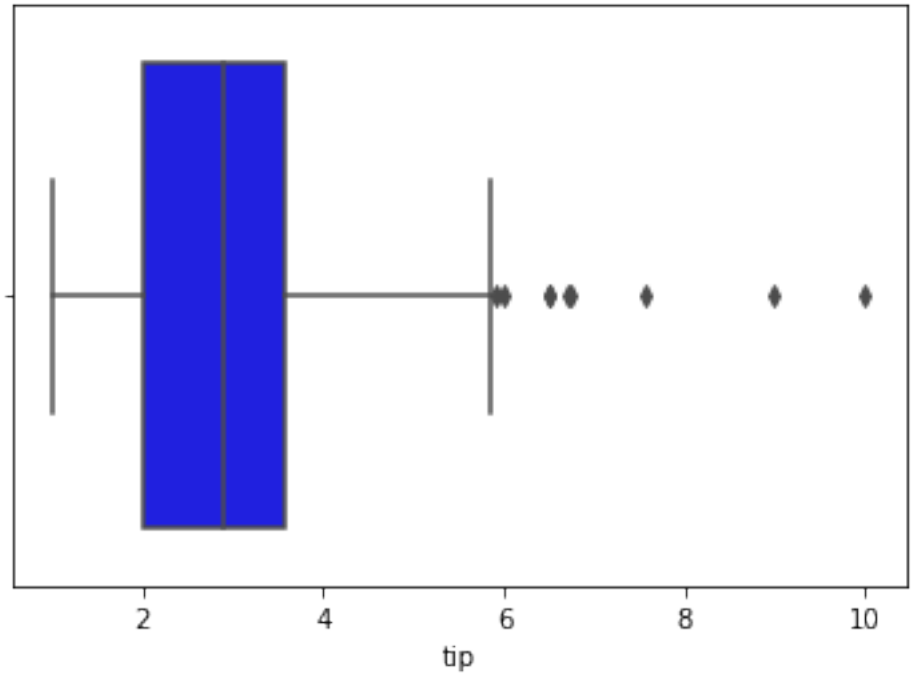
[77]:
```
#distribution of tips
sns.distplot(x=tips_df.tip, hist=True, kde=True, color='r')
```

[77]:
```
<AxesSubplot:ylabel='Density'>
```



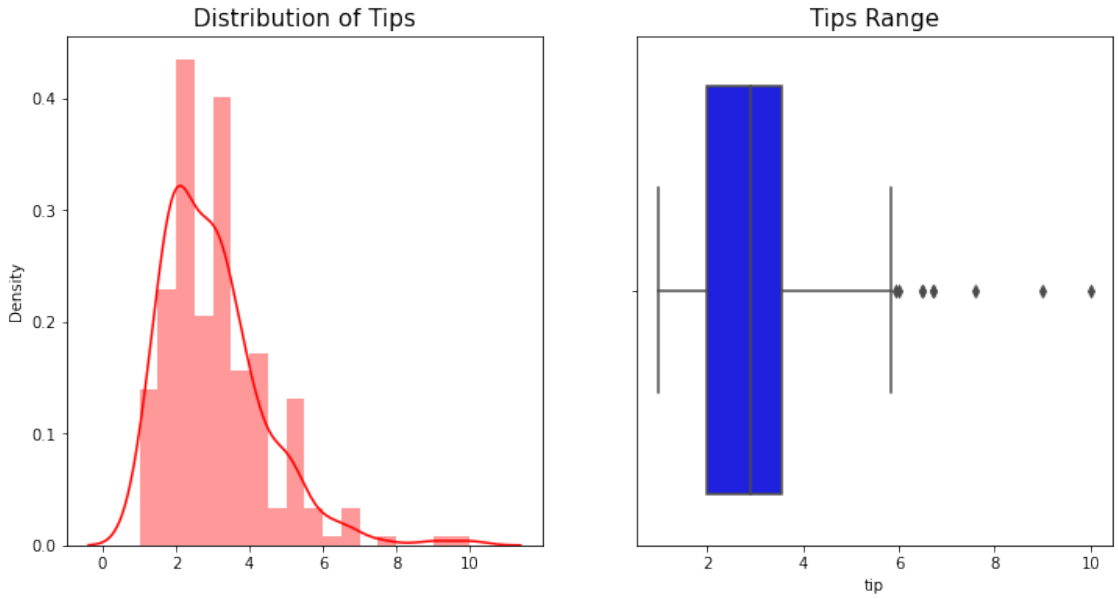
[78]:
```
# to find out the range
sns.boxplot(tips_df.tip, color = 'b')
```

[78]: <AxesSubplot:xlabel='tip'>



[79]:
```
fig, axes = plt.subplots(1,2, figsize =(12,6))

#distribution of tips
sns.distplot(x=tips_df.tip, hist=True, kde=True, color='r',ax=axes[0])

# to find out the range

sns.boxplot(tips_df.tip, color = 'b',ax=axes[1])
axes[0].set_title("Distribution of Tips",fontsize=15)
axes[1].set_title("Tips Range",fontsize=15)
```

[79]:
```
Text(0.5, 1.0, 'Tips Range')
```

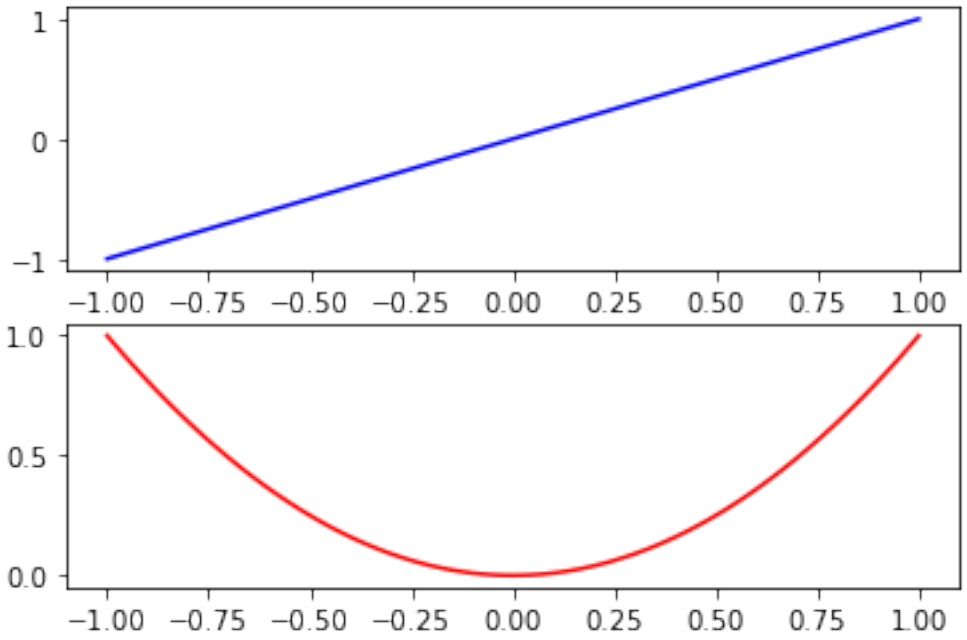


1.5 Subplots

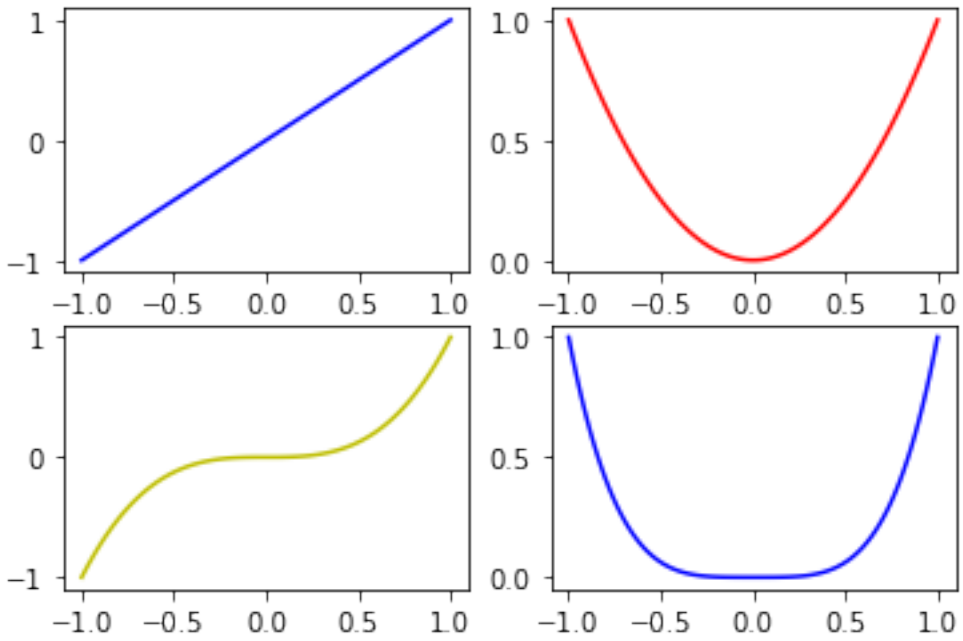
[80]:
```
x = np.linspace(-1,1,101)
y1 = x
y2 = x**2
y3 = x**3
y4 = x**4
```

[81]:
```
fig,ax = plt.subplots(2,1)
ax[0].plot(x,y1,color ='b')
ax[1].plot(x,y2, color='r')
```

[81]: [<matplotlib.lines.Line2D at 0x1b56565bcd0>]



[82]:
```
fig,ax = plt.subplots(2,2)
ax[0,0].plot(x,y1, color ='b')
ax[0,1].plot(x,y2, color='r')
ax[1,0].plot(x,y3, color='y')
ax[1,1].plot(x,y4, color='b')
fig.show()
```



[83]:
```
#Load the dataset
diamonds = pd.read_csv('diamonds.csv')
```

[84]:
```
diamonds.head()
```

[84]:

	Unnamed: 0	carat	cut	color	clarity	depth	table	price	x	y	z
0	1	0.23	Ideal	E	SI2	61.5	55.0	326	3.95	3.98	2.43
1	2	0.21	Premium	E	SI1	59.8	61.0	326	3.89	3.84	2.31
2	3	0.23	Good	E	VS1	56.9	65.0	327	4.05	4.07	2.31
3	4	0.29	Premium	I	VS2	62.4	58.0	334	4.20	4.23	2.63
4	5	0.31	Good	J	SI2	63.3	58.0	335	4.34	4.35	2.75

[85]:
```
#checking the shape
diamonds.shape
```

[85]:
```
(53940, 11)
```

[86]:
```
#filter the value where clarity is in {'SI1','VI2'}
diamond =diamonds[diamonds.clarity.isin(['SI1','VS2'])]
```

[87]:
```
#checkig the shape after filtering
diamond.shape
```

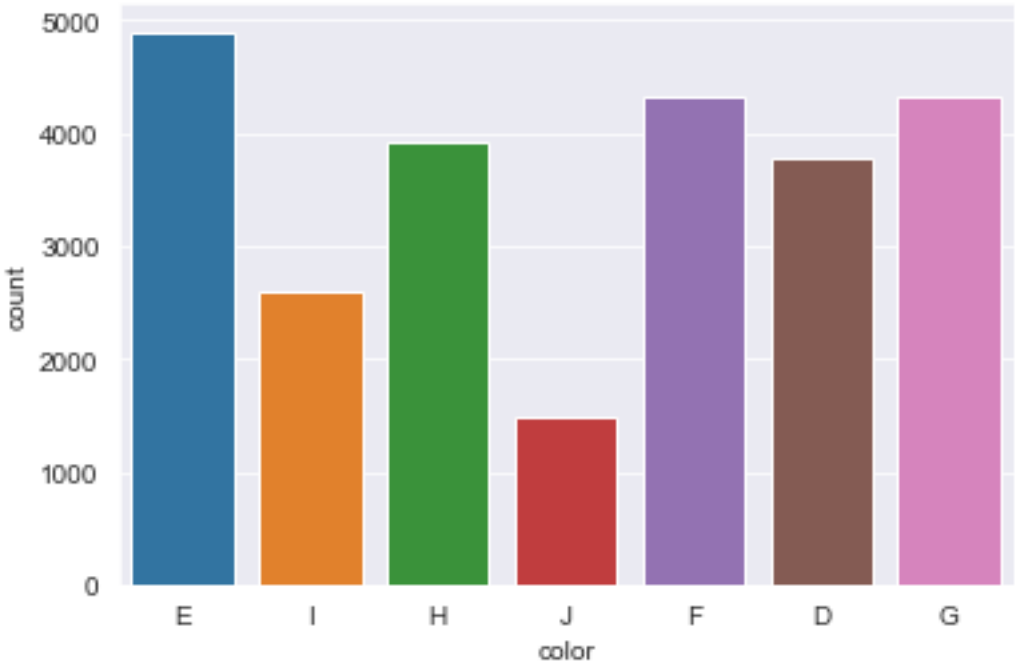
[87]:
```
(25323, 11)
```

Countplots

[88]:
```
sns.set_style('darkgrid')
```

[89]:
```
sns.countplot(x='color',data=diamond)
```

[89]:
```
<AxesSubplot:xlabel='color', ylabel='count'>
```

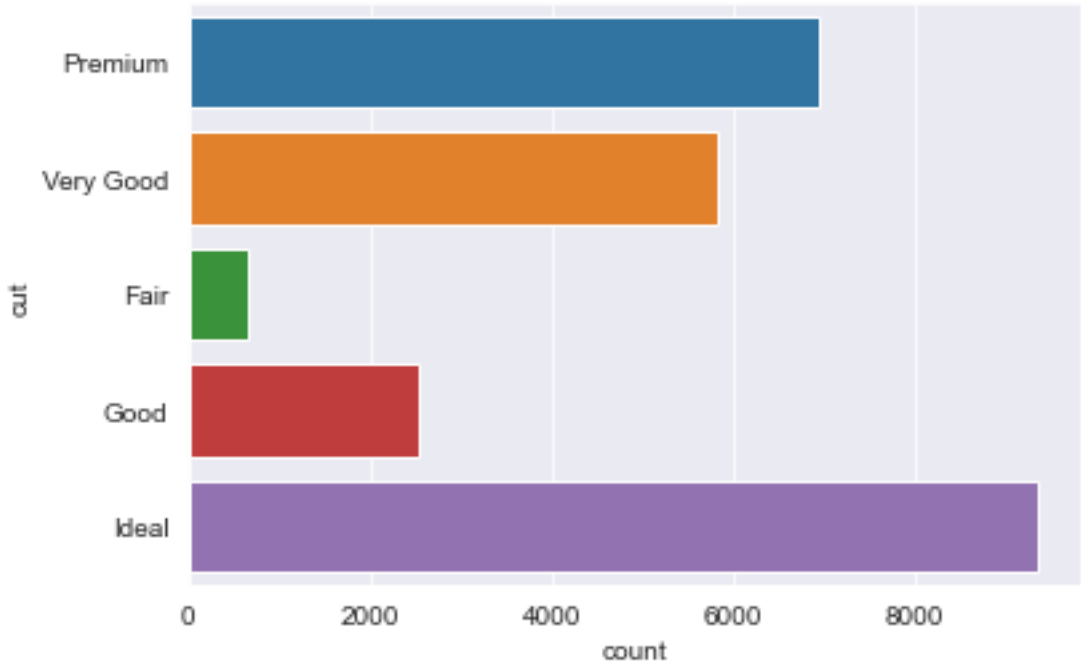


[90]:
```
#checking the value counts of color
diamond.color.value_counts()
```

[90]:
```
E    4896
F    4332
G    4323
H    3918
D    3780
I    2593
J    1481
Name: color, dtype: int64
```

[91]:
```
# use y to change the orientation instead of x
sns.countplot(y='cut',data=diamond)
```

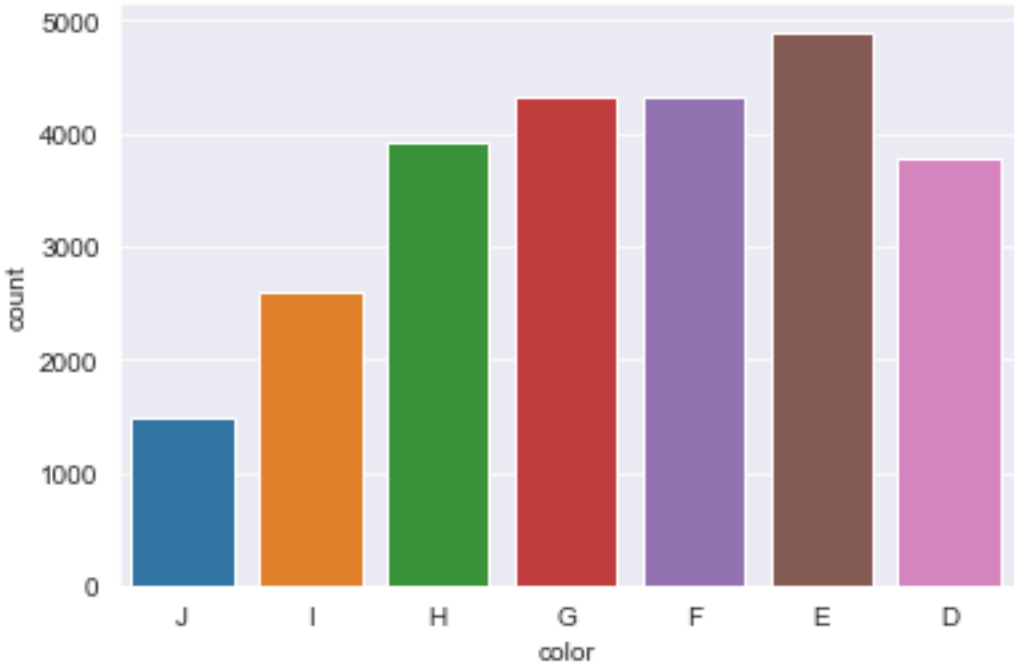
[91]:
```
<AxesSubplot:xlabel='count', ylabel='cut'>
```



[92]:
```
#checking the datatypes
diamond.dtypes
```

[92]:
```
Unnamed: 0      int64
carat         float64
cut            object
color          object
clarity        object
depth         float64
table         float64
price           int64
x             float64
y             float64
z             float64
dtype: object
```

[93]:
```
#Providing the order
color_order = ['J','I','H','G','F','E','D']
sns.countplot(x='color',data=diamond,order=color_order);
```



1.6 Order Ascending or Descending

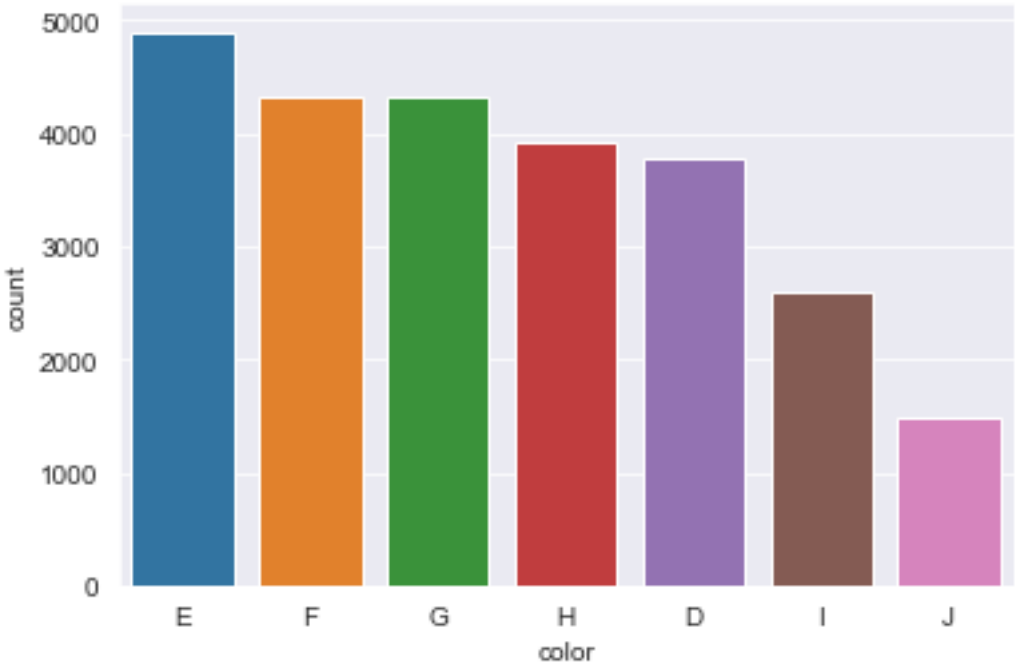
[94]:
```
#checking the value counts
diamond.color.value_counts()
```

[94]:
```
E    4896
F    4332
G    4323
H    3918
D    3780
I    2593
J    1481
Name: color, dtype: int64
```

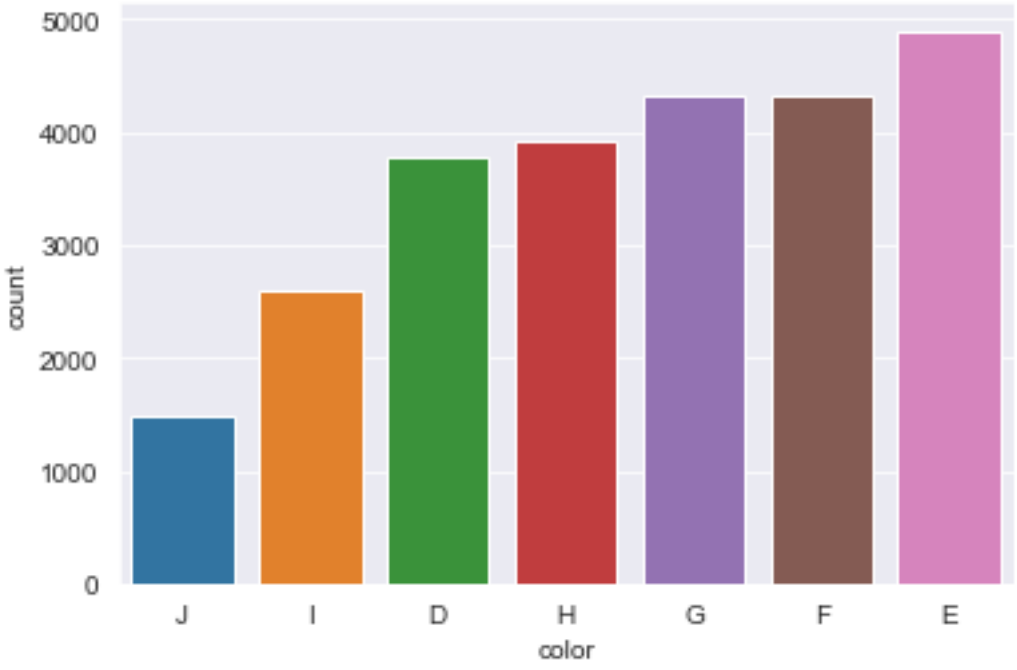
[95]:
```
#checking the Index
diamond.color.value_counts().index
```

[95]:
```
Index(['E', 'F', 'G', 'H', 'D', 'I', 'J'], dtype='object')
```

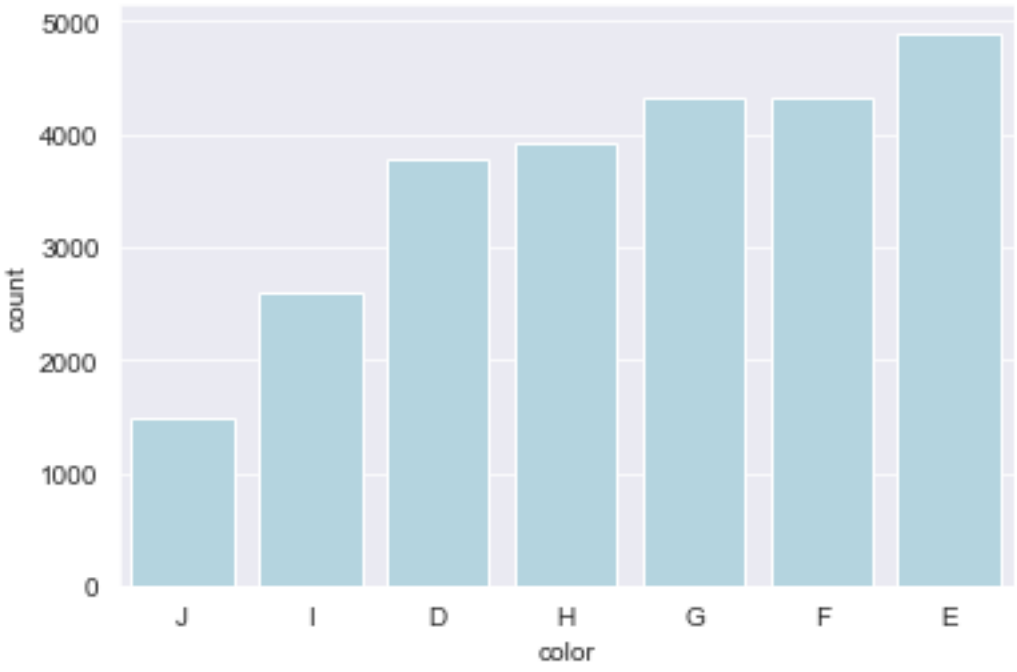
[96]:
```
#plotting as per index (plotting in descending order)
sns.countplot(x='color', data=diamond, order=diamond.color.value_counts().
 ↪index);
```



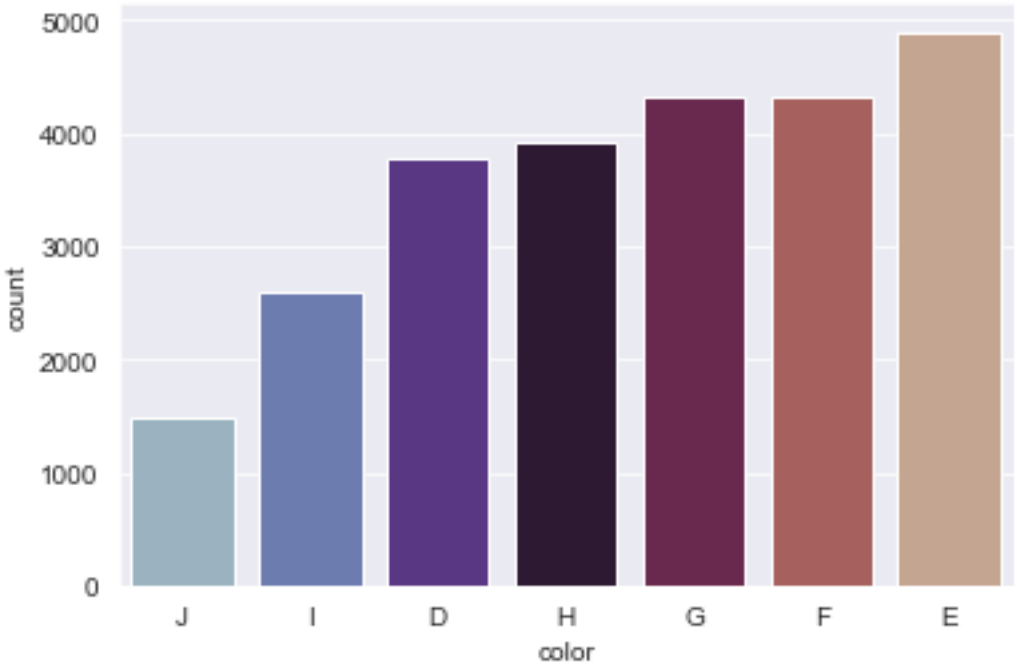
[97]:
```
#plotting in ascending order
sns.countplot(x='color', data=diamond, order=diamond.color.value_counts().
 ↪index[::-1]);
```



[98]:
```
# setting the color to Black
sns.countplot(x='color', data=diamond, order=diamond.color.value_counts().
 ↪index[::-1],color='lightblue');
```

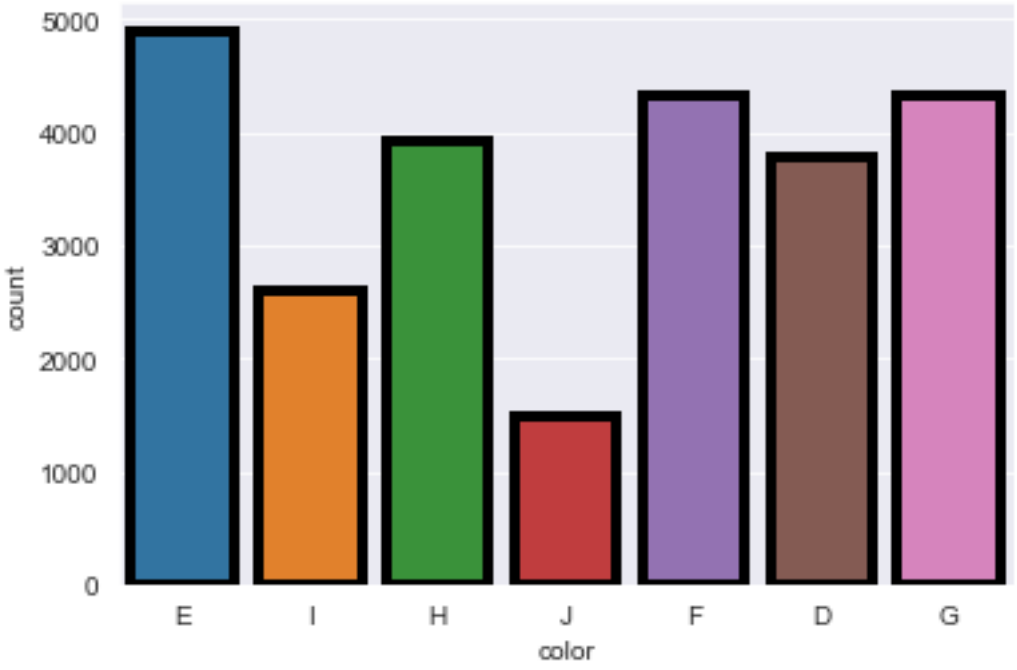


[99]:
```
# setting the color to Black
sns.countplot(x='color', data=diamond, order=diamond.color.value_counts().
 ↪index[::-1],palette='twilight');
```



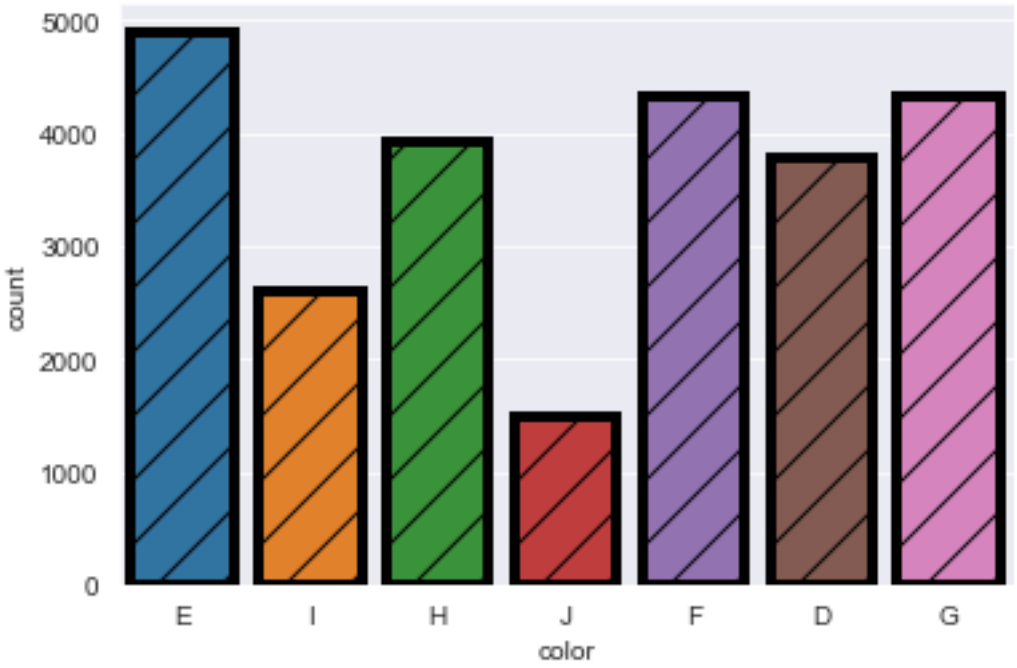
[100]:
```
#line width and edge color
sns.countplot(x='color',data=diamond, lw=4, ec='black')
```

[100]: <AxesSubplot:xlabel='color', ylabel='count'>



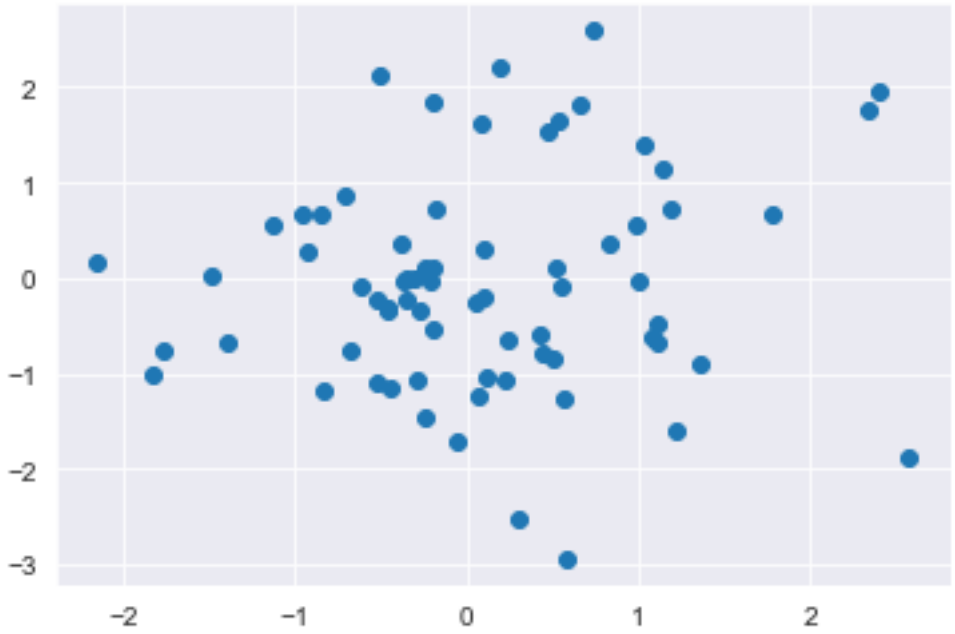
[101]:
```
#hatching
sns.countplot(x='color',data=diamond, lw=4, ec='black',hatch='/')
```

[101]:
```
<AxesSubplot:xlabel='color', ylabel='count'>
```

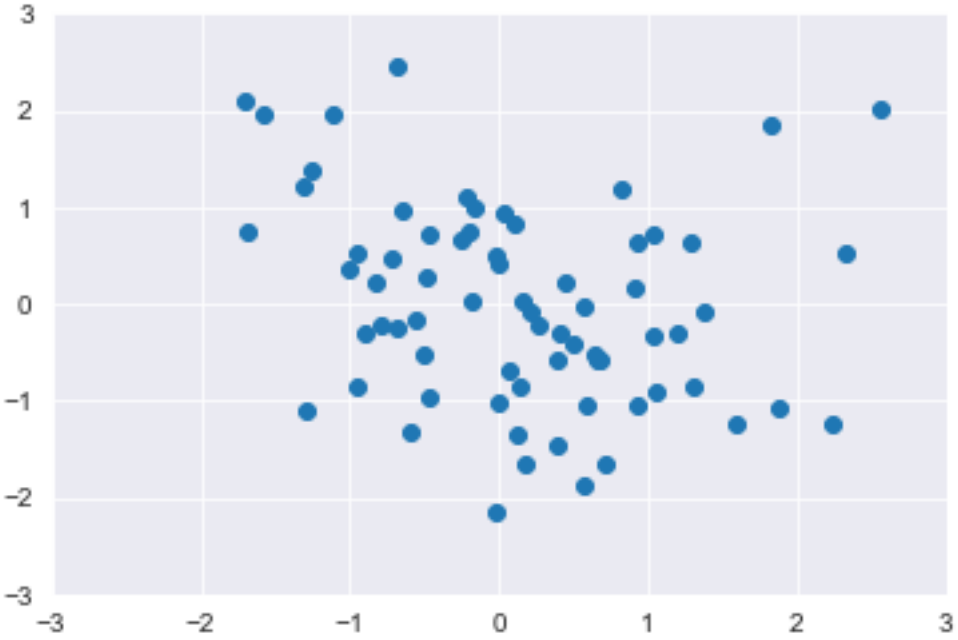


1.7 Scatter plot

[102]:
```
y1 = np.random.randn(70)
y2 = np.random.randn(70)
# Both y1 and y2 should be of same size
plt.scatter(y1,y2)
plt.show()
```

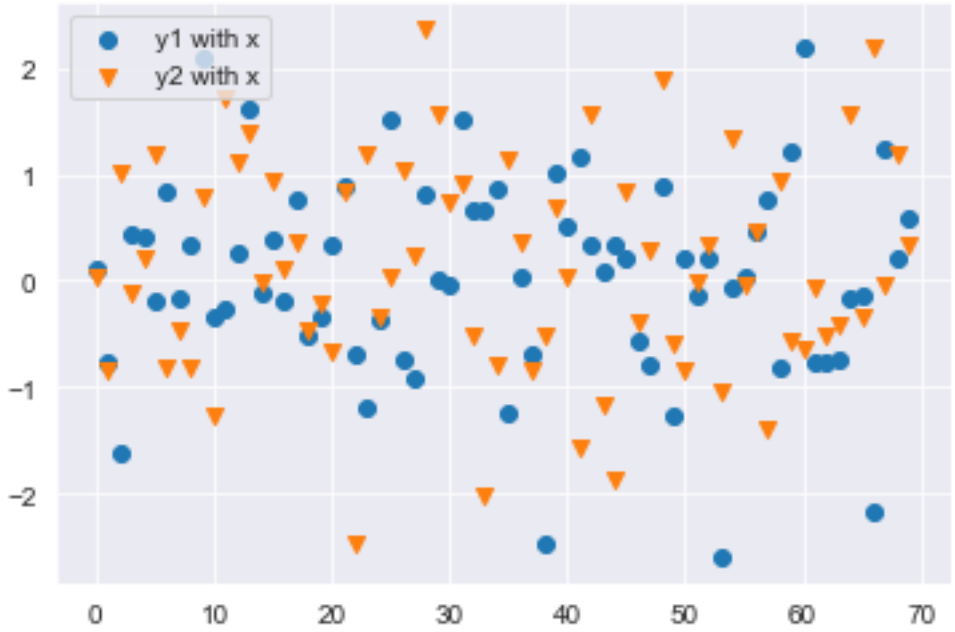


[103]:
```
## adjust axis, if required
y1 = np.random.randn(70)
y2 = np.random.randn(70)
plt.scatter(y1,y2)
plt.axis([-3,3,-3,3]) #plt.axis([Xmin,Xmax,Ymin,Ymax])
plt.show()
```



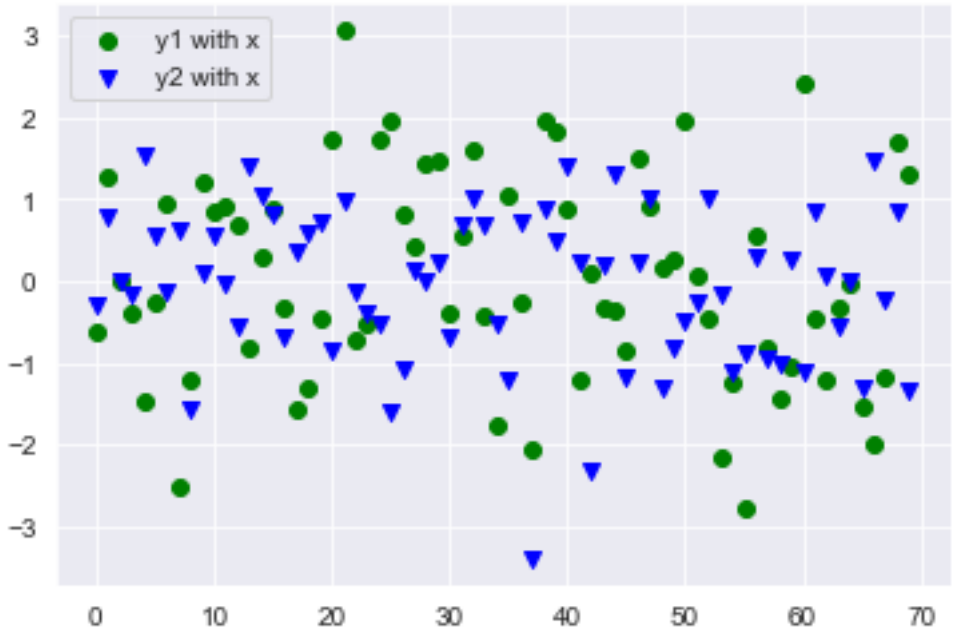
[104]:
```
# using the scatter plot with comman axis
x = np.arange(70)
y1 = np.random.randn(70)
y2 = np.random.randn(70)
plt.scatter(x,y1, marker='o', label ='y1 with x')
plt.scatter(x,y2, marker='v', label ='y2 with x')
plt.legend(loc='upper left')
```

[104]: <matplotlib.legend.Legend at 0x1b565e3e370>



[105]:
```
#assigning the colors
x = np.arange(70)
y1 = np.random.randn(70)
y2 = np.random.randn(70)
plt.scatter(x,y1, marker='o', label ='y1 with x',color='g')
plt.scatter(x,y2, marker='v', label ='y2 with x',color='b')
plt.legend(loc='upper left')
```

[105]: <matplotlib.legend.Legend at 0x1b565eb22e0>



1.8 Line Plot

[106]:
```
# extract data from various Internet sources into a pandas DataFrame
import pandas_datareader as pdr
```

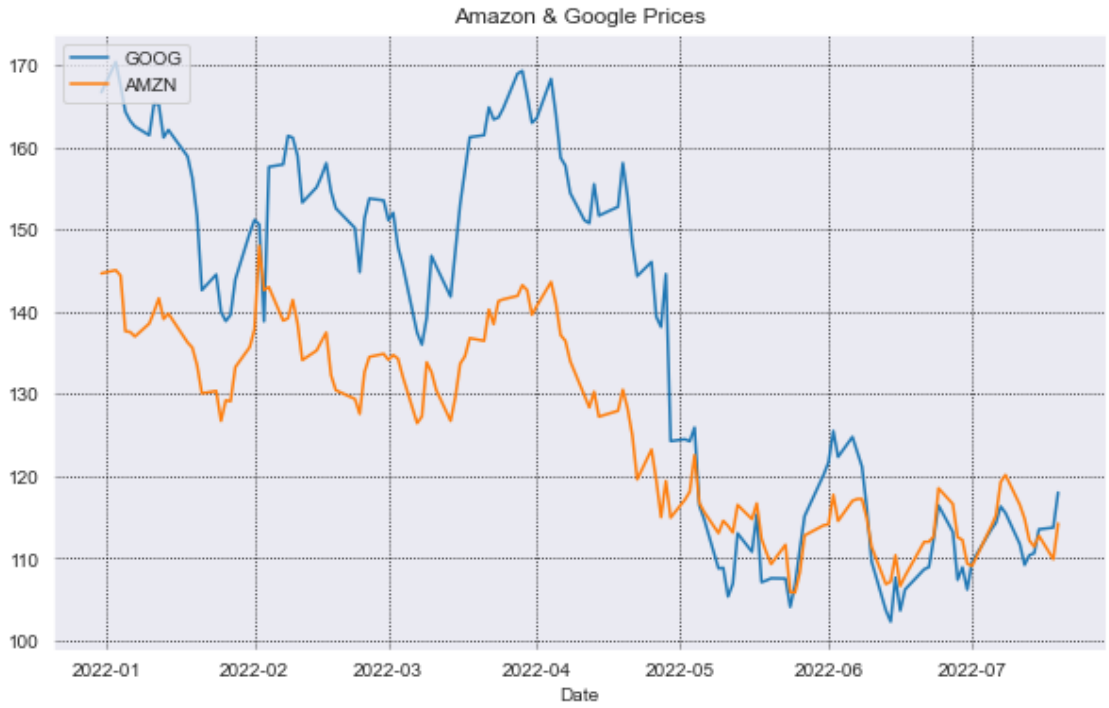
[107]:
```
#extracting Data
stocks = ['GOOG', 'AMZN']
data = pdr.get_data_yahoo(stocks, start = '2022-01-01')['Close']
data.head()
```

[107]:
```
Symbols            GOOG        AMZN
Date
2021-12-31   144.679504  166.716995
2022-01-03   145.074493  170.404495
2022-01-04   144.416504  167.522003
2022-01-05   137.653503  164.356995
2022-01-06   137.550995  163.253998
```

[108]:
```
from matplotlib import rcParams
rcParams['figure.figsize'] = 10,6
plt.plot(data.AMZN)
plt.plot(data.GOOG)
plt.grid(True, color='k', linestyle=':')
plt.title("Amazon & Google Prices")
plt.xlabel("Date")
```

```
plt.legend(['GOOG','AMZN'],loc =2)
```

[108]: <matplotlib.legend.Legend at 0x1b5666b9d60>



1.8.1 Refer to below link for more details

- https://matplotlib.org/3.1.1/gallery/style_sheets/style_sheets_reference.html
- https://matplotlib.org/3.1.1/api/markers_api.html formore details

[109]:
```
#loading the Dataset
tips = pd.read_csv('tips.csv')
```

[110]:
```
#checking the head of data
tips.head()
```

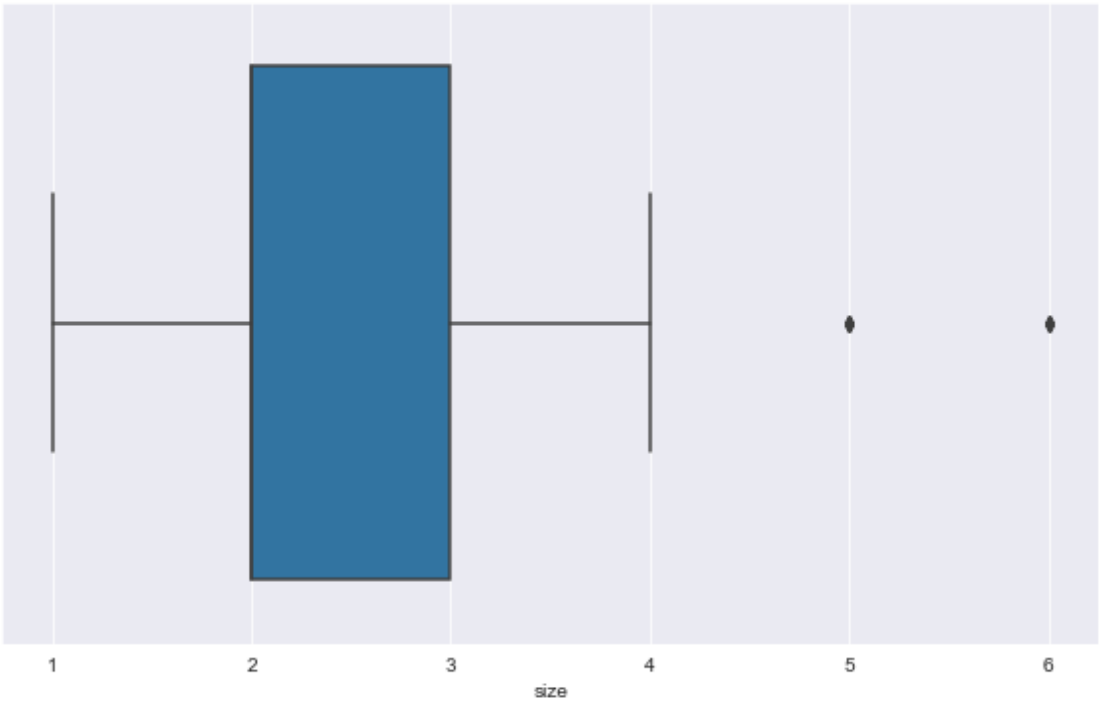
[110]:

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

1.9 Boxplot

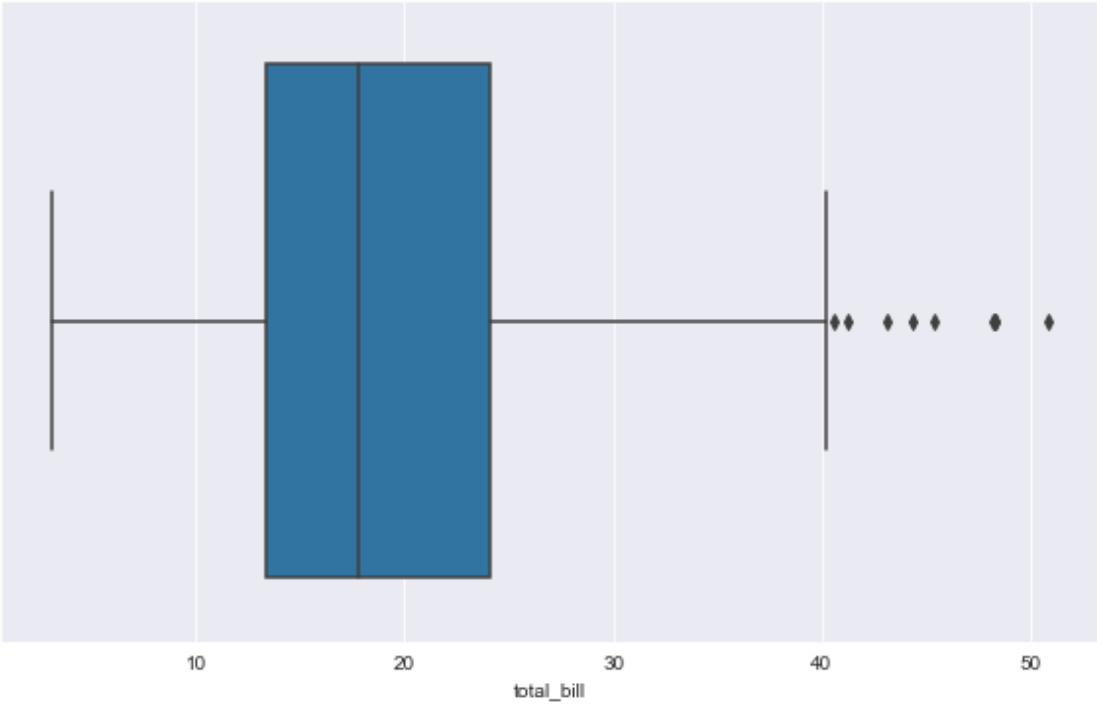
[111]:
```
sns.boxplot(tips['size'])
```

[111]:
```
<AxesSubplot:xlabel='size'>
```



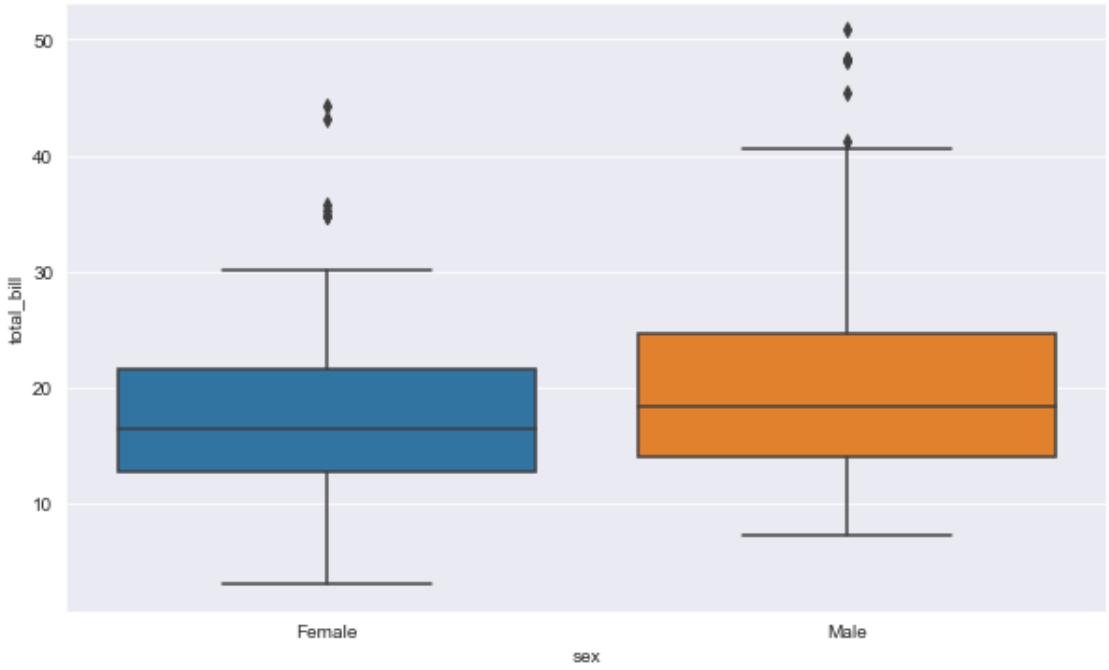
[112]:
```
sns.boxplot(tips['total_bill'])
```

[112]:
```
<AxesSubplot:xlabel='total_bill'>
```



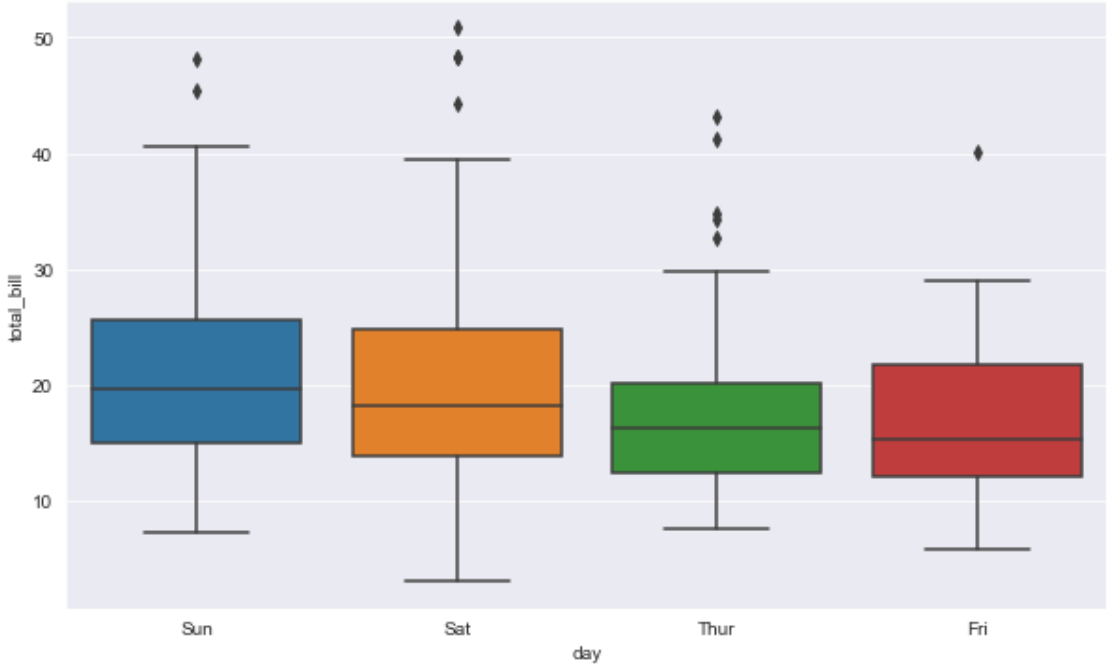
[113]:
```
sns.boxplot(x='sex', y ='total_bill', data=tips)
```

[113]: <AxesSubplot:xlabel='sex', ylabel='total_bill'>



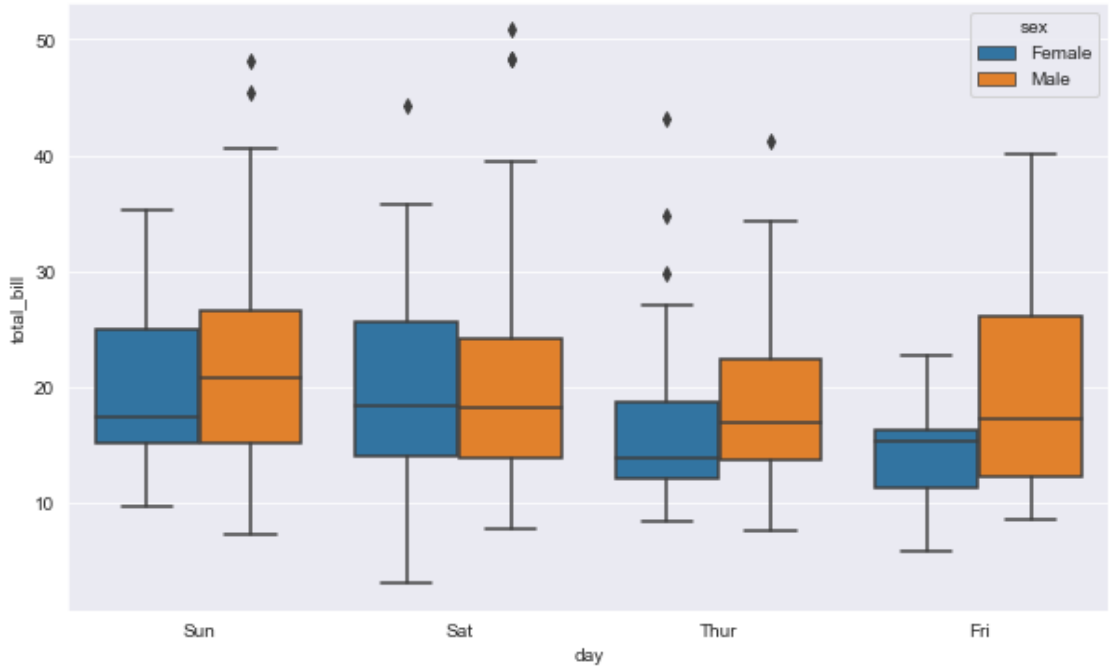
[114]:
```
sns.boxplot(x='day', y ='total_bill', data=tips)
```

[114]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



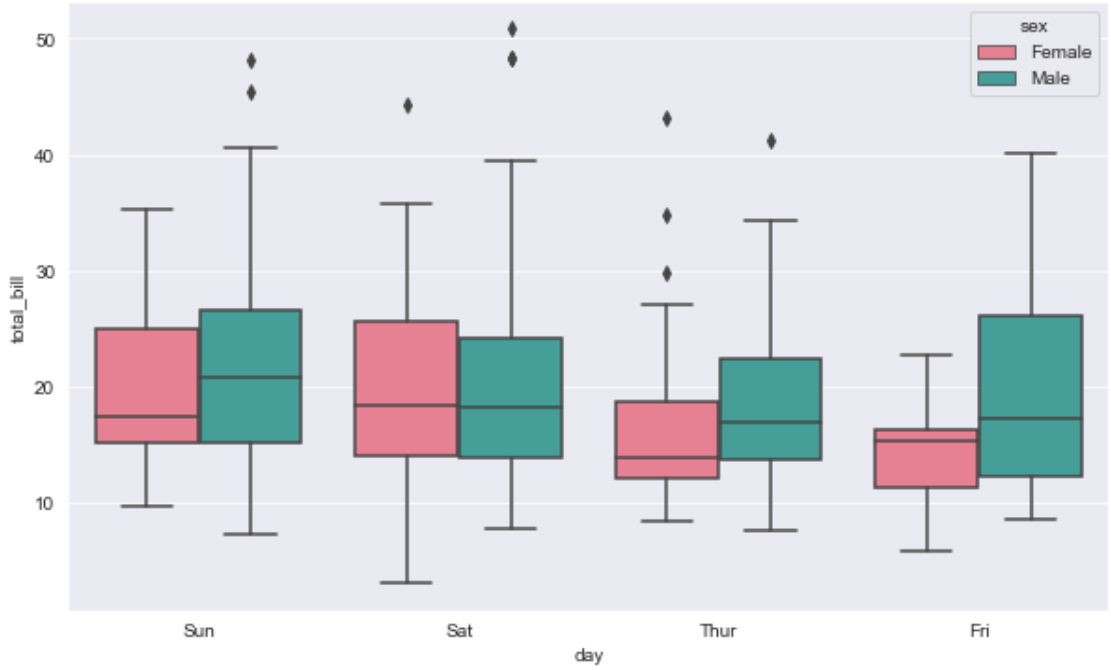
[115]:
```
sns.boxplot(x='day', y ='total_bill', data=tips,hue='sex')
```

[115]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



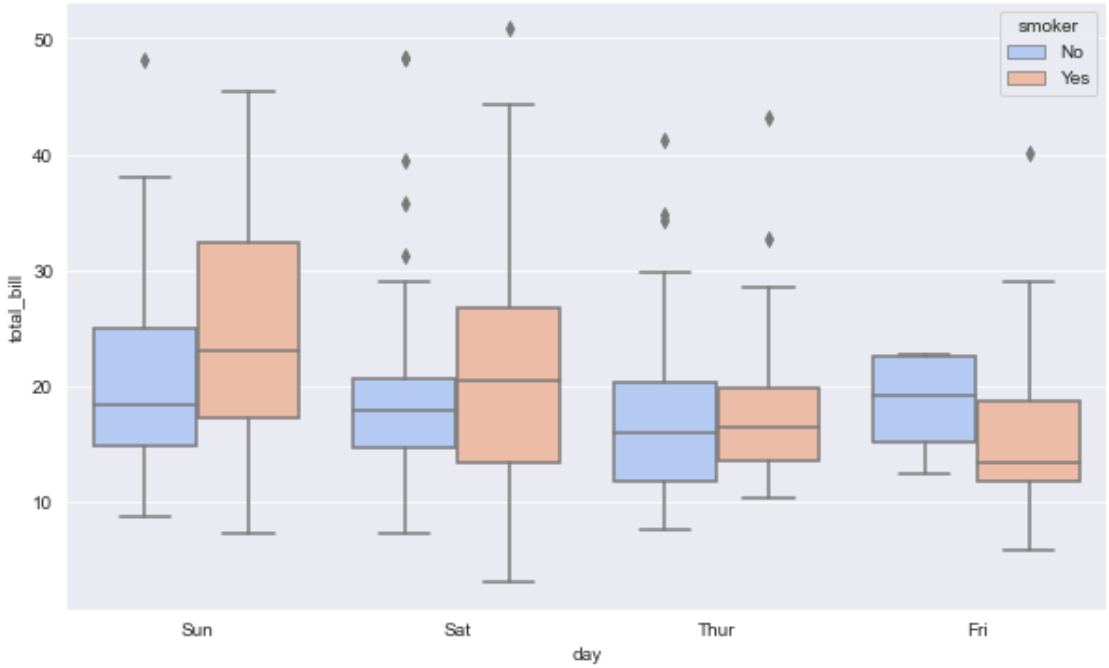
[116]:
```
sns.boxplot(x='day', y ='total_bill', data=tips,hue='sex',palette ='husl')
```

[116]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



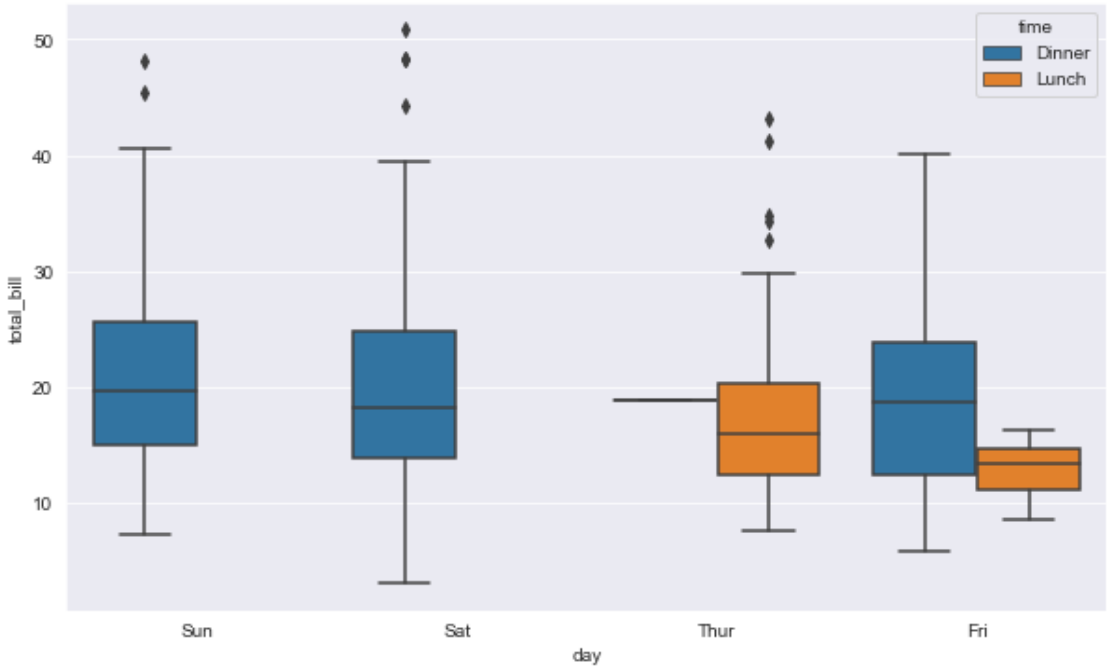
[117]:
```
sns.boxplot(x='day', y ='total_bill', data=tips,hue='smoker',palette␣
↪='coolwarm')
```

[117]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



[118]:
```
sns.boxplot(x='day', y ='total_bill', data=tips,hue='time')
```

[118]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



1.10 Joint Distribution

[119]:
```
iris = pd.read_csv('Iris.csv')
```

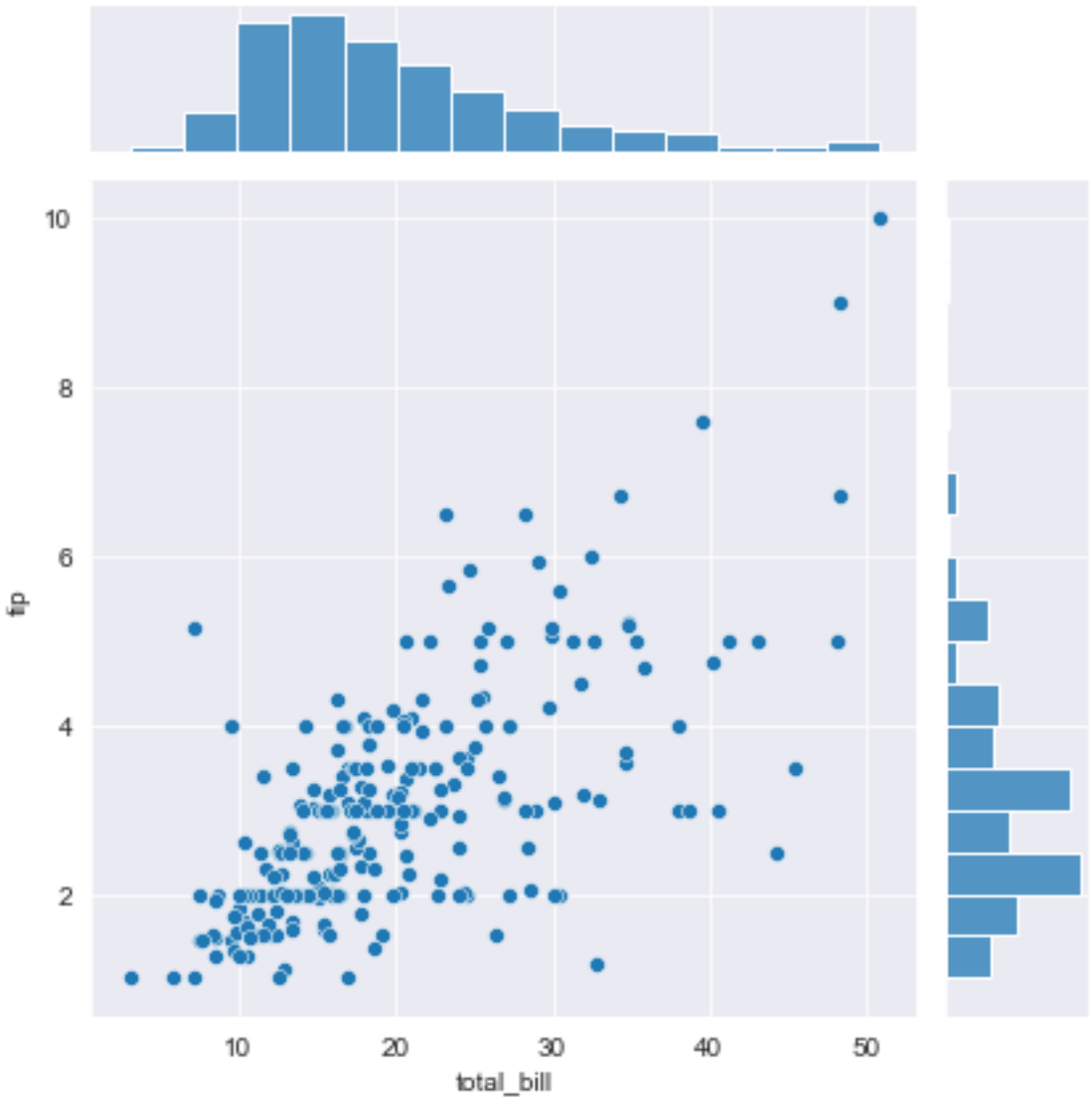
[120]:
```
iris.head()
```

[120]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa

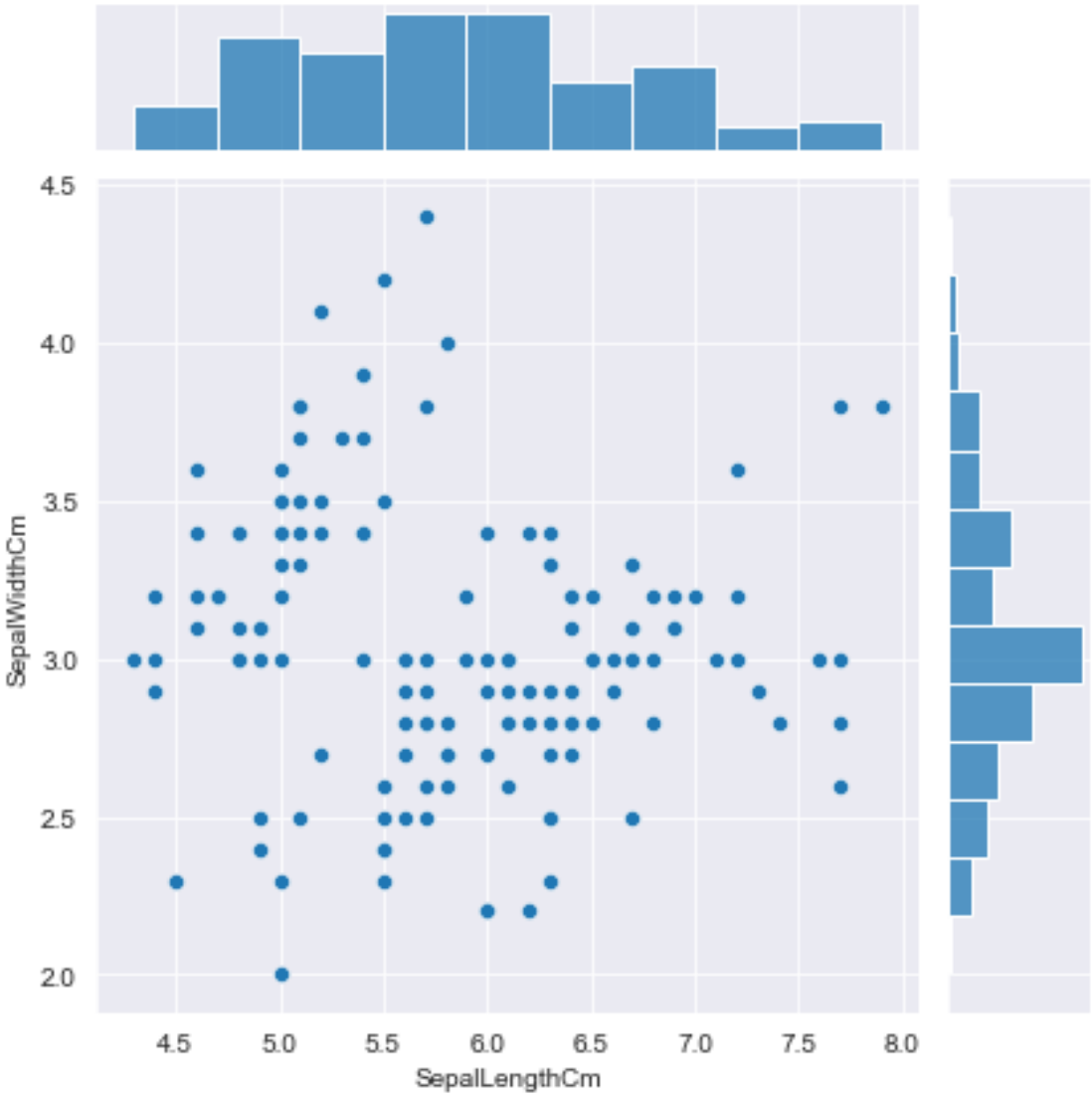
[121]:
```
sns.jointplot(x='total_bill', y='tip', data=tips)
```

[121]:
```
<seaborn.axisgrid.JointGrid at 0x1b566796fa0>
```



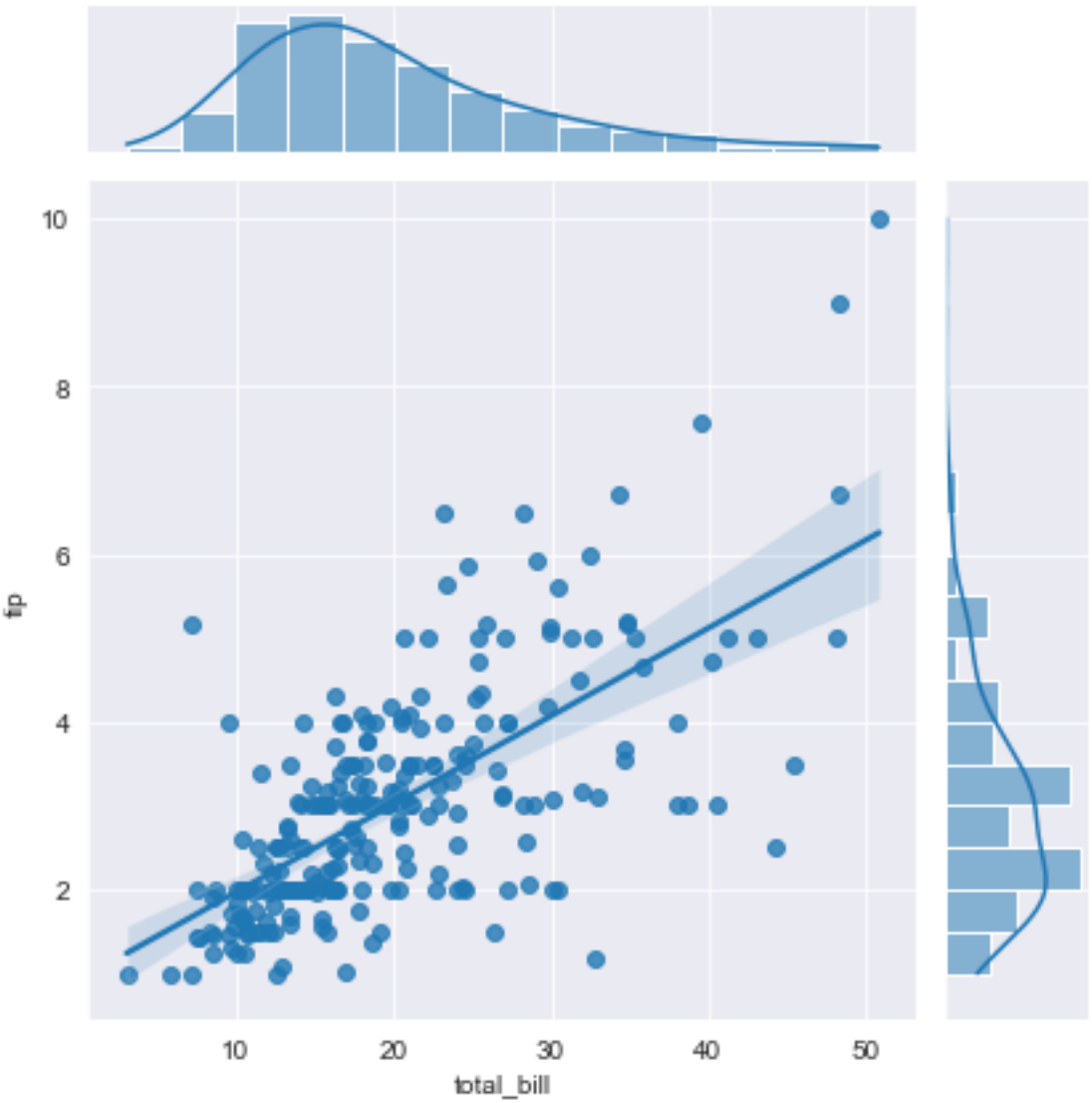
[122]:
```
sns.jointplot(x='SepalLengthCm', y='SepalWidthCm', data=iris)
```

[122]:
```
<seaborn.axisgrid.JointGrid at 0x1b566654400>
```



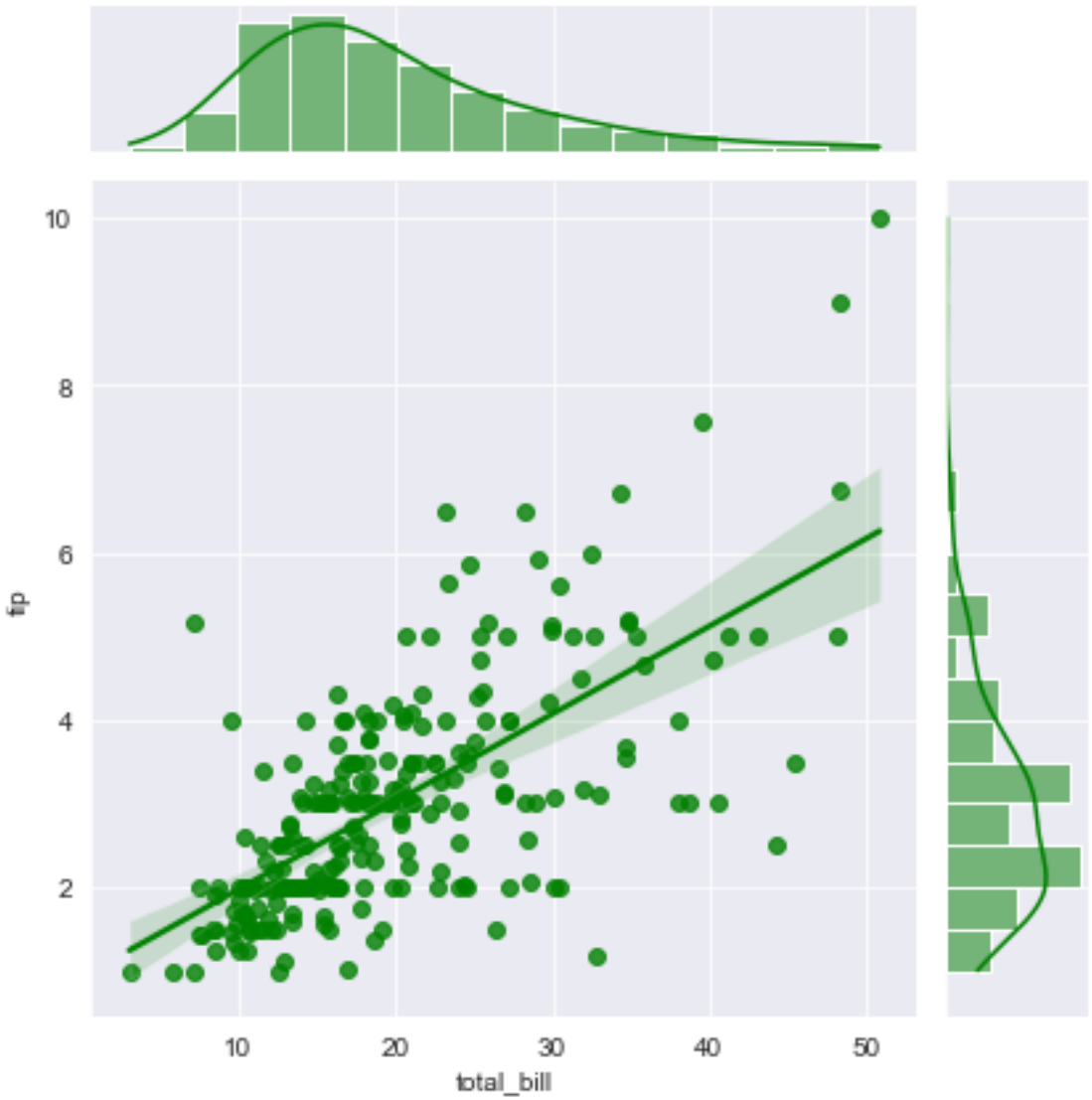
[123]:
```
# adding regression lines
sns.jointplot(x='total_bill', y='tip', data=tips, kind='reg')
```

[123]: <seaborn.axisgrid.JointGrid at 0x1b566a11be0>



[124]:
```
sns.jointplot(x='total_bill', y='tip', data=tips, kind='reg',color='green')
```

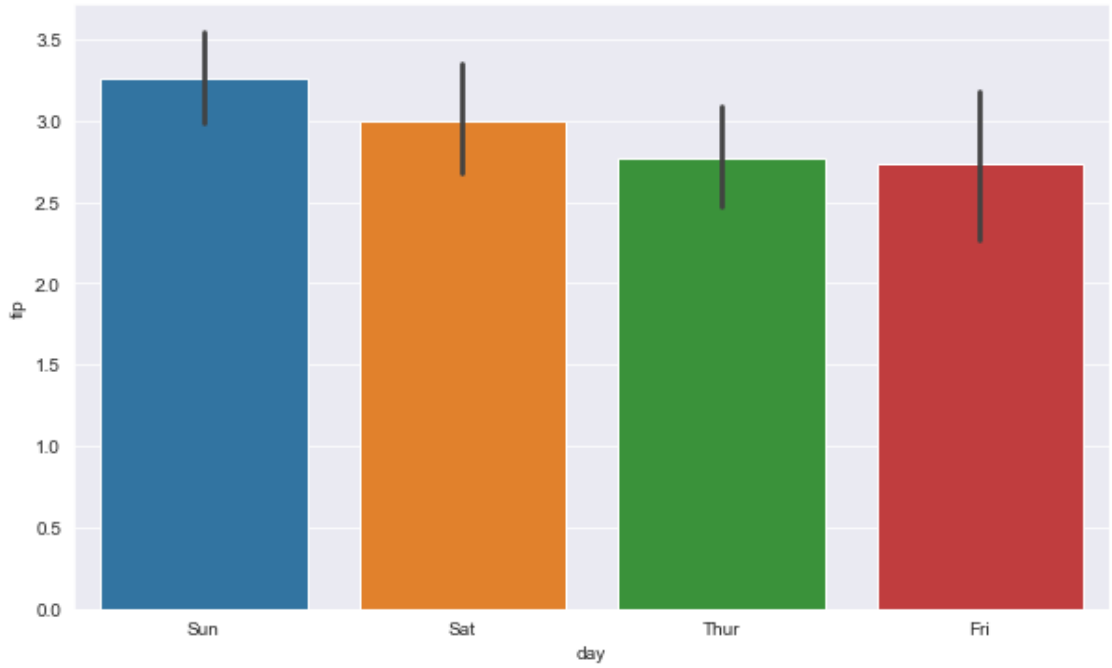
[124]: <seaborn.axisgrid.JointGrid at 0x1b567d33d90>



1.11 Bar Plots

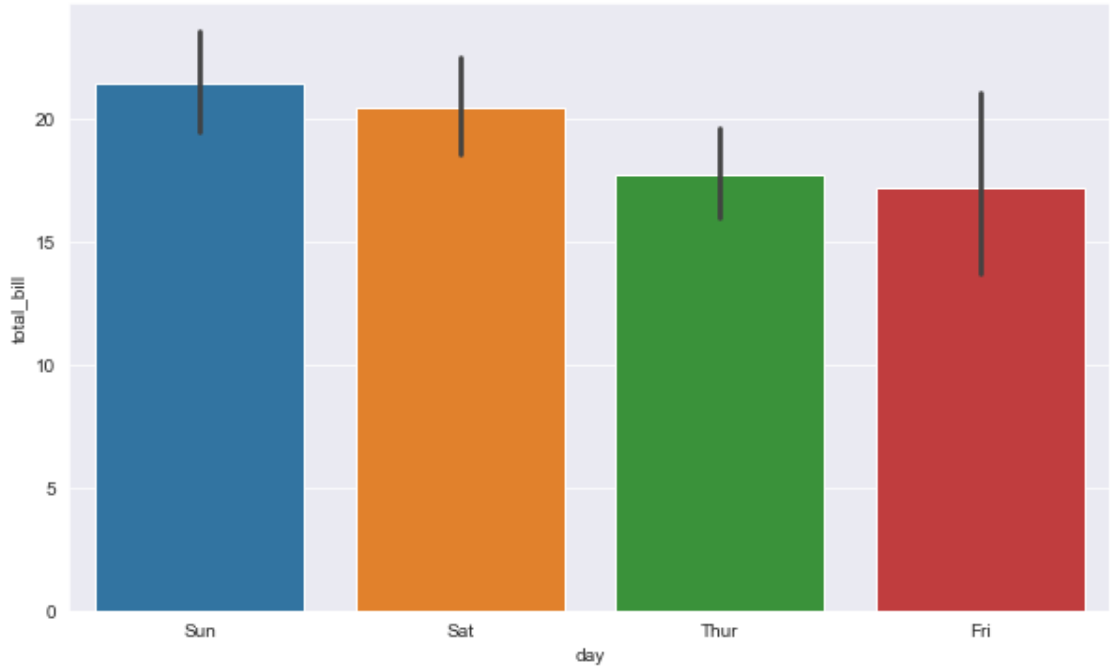
[125]:
```
sns.barplot(x='day', y ='tip',data=tips)
```

[125]:
```
<AxesSubplot:xlabel='day', ylabel='tip'>
```



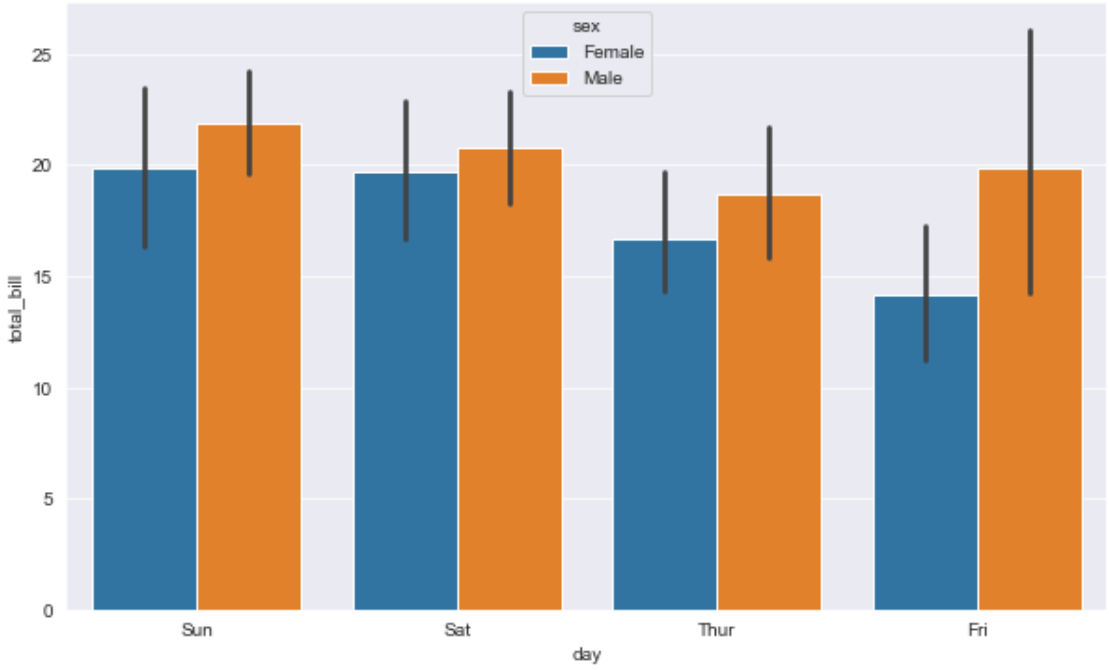
[126]:
```
sns.barplot(x='day', y ='total_bill',data=tips)
```

[126]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



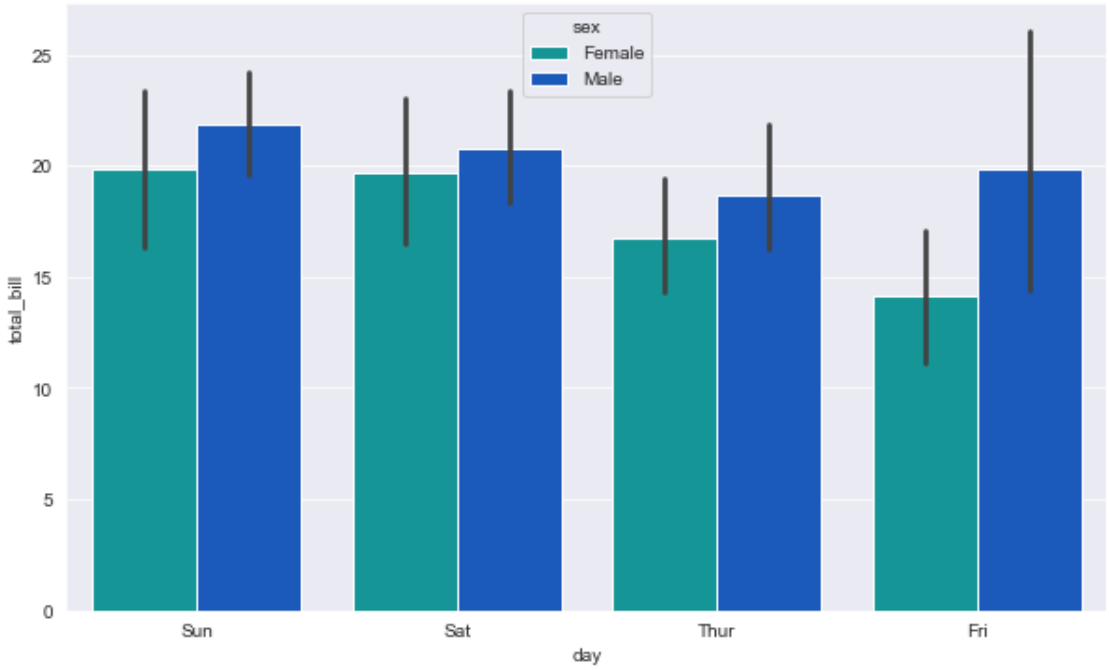
[127]:
```
sns.barplot(x='day', y ='total_bill',data=tips,hue='sex')
```

[127]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



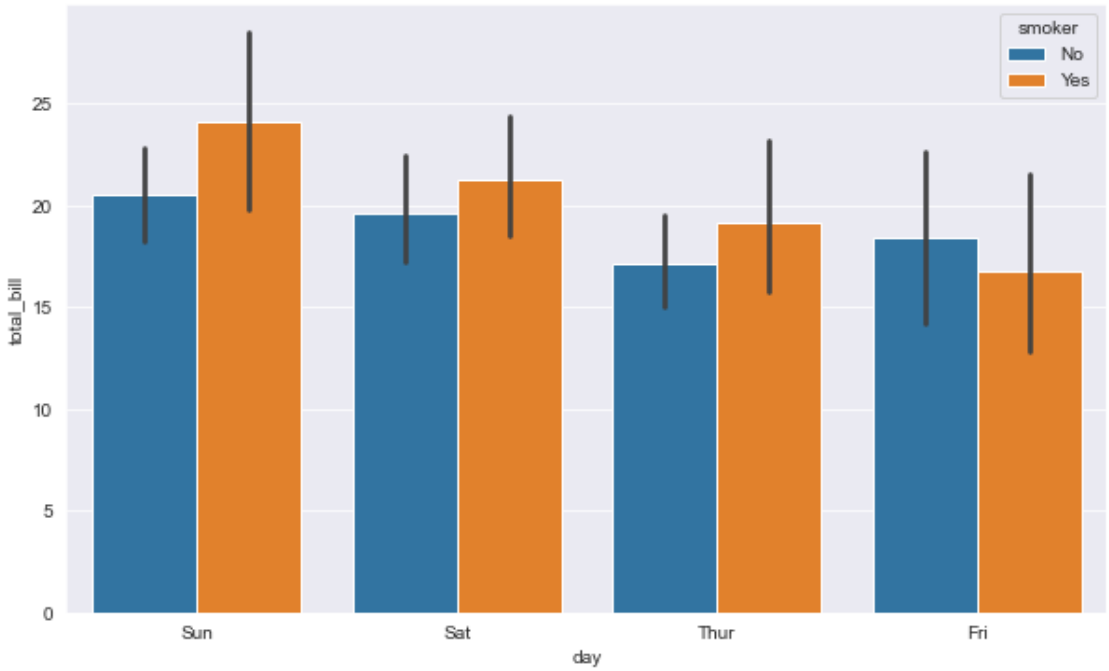
[128]:
```
sns.barplot(x='day', y ='total_bill',data=tips,hue='sex', palette='winter_r')
```

[128]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



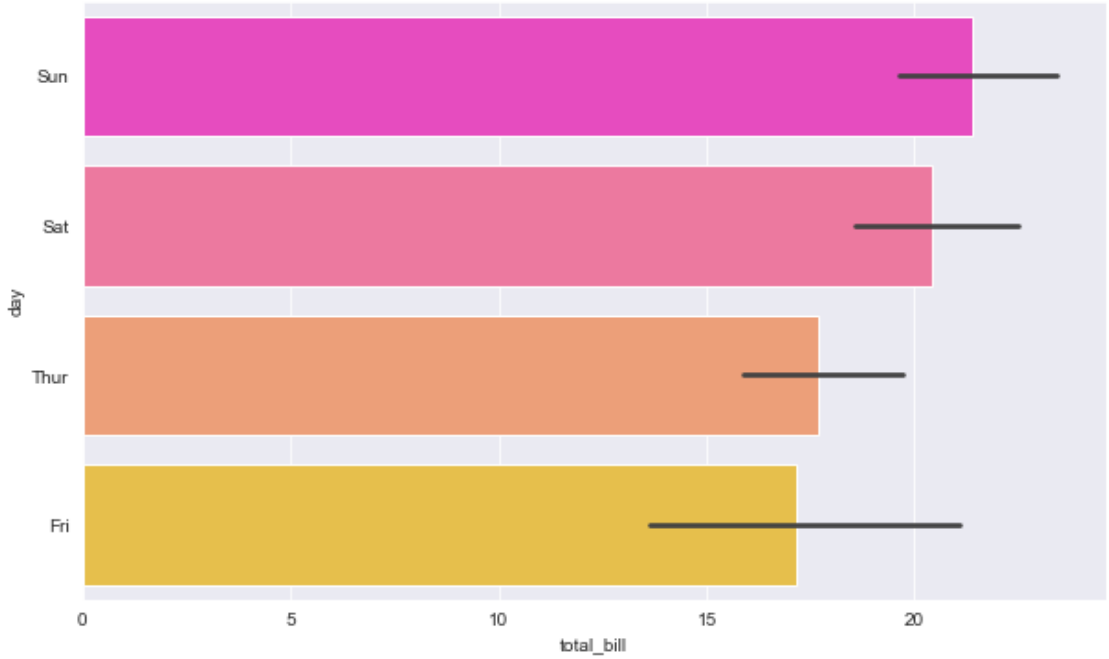
[129]:
```
sns.barplot(x='day', y ='total_bill',data=tips,hue='smoker')
```

[129]: <AxesSubplot:xlabel='day', ylabel='total_bill'>



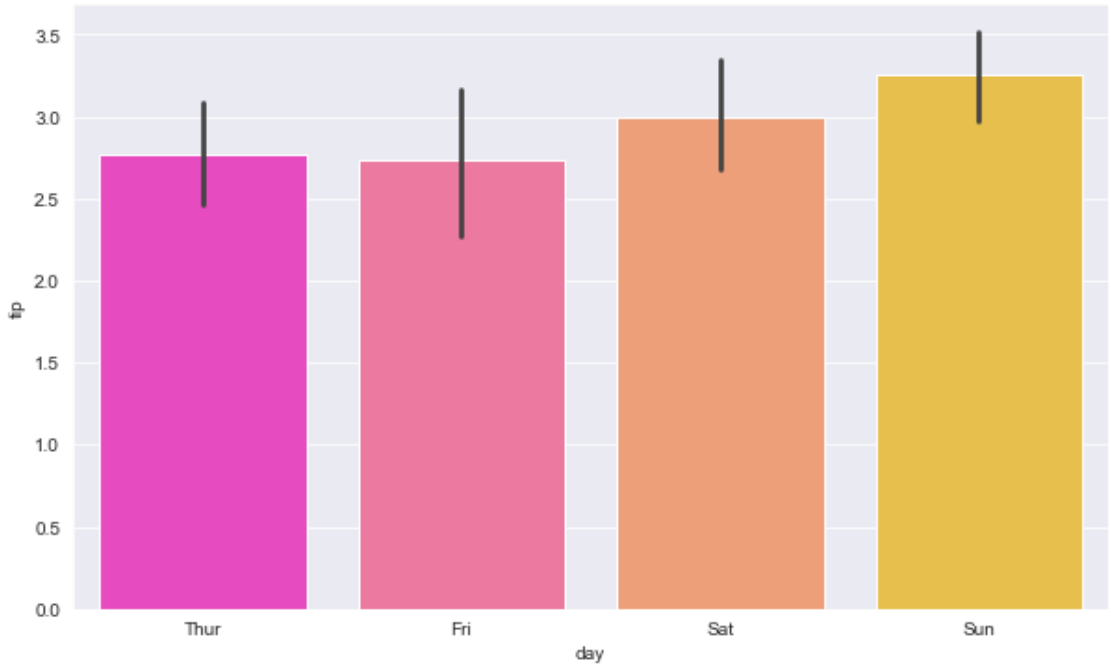
[130]:
```
sns.barplot(x='total_bill', y ='day' , data = tips, palette ='spring')
```

[130]: <AxesSubplot:xlabel='total_bill', ylabel='day'>



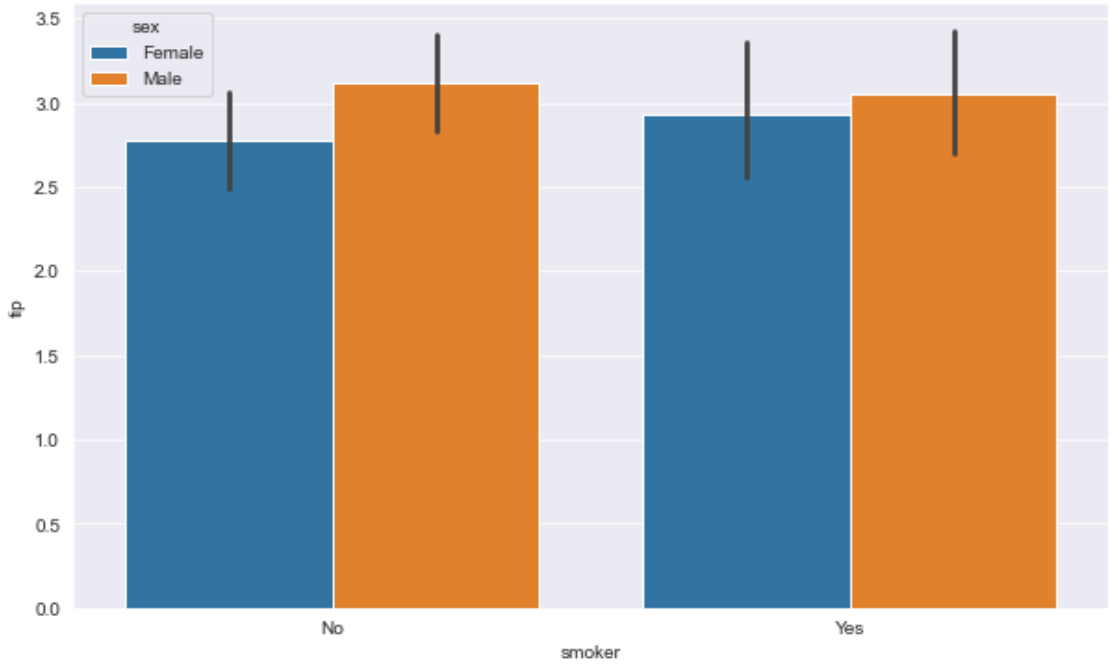
[131]:
```
sns.barplot(x='day', y ='tip' , data = tips, palette␣
↪='spring',order=['Thur','Fri','Sat','Sun'])
```

[131]: <AxesSubplot:xlabel='day', ylabel='tip'>



[132]:
```
sns.barplot(x='smoker', y ='tip' , data = tips,hue='sex')
```

[132]: <AxesSubplot:xlabel='smoker', ylabel='tip'>



[133]:
```
#Laod the dataset
df = pd.read_csv('mtcars.csv')
```

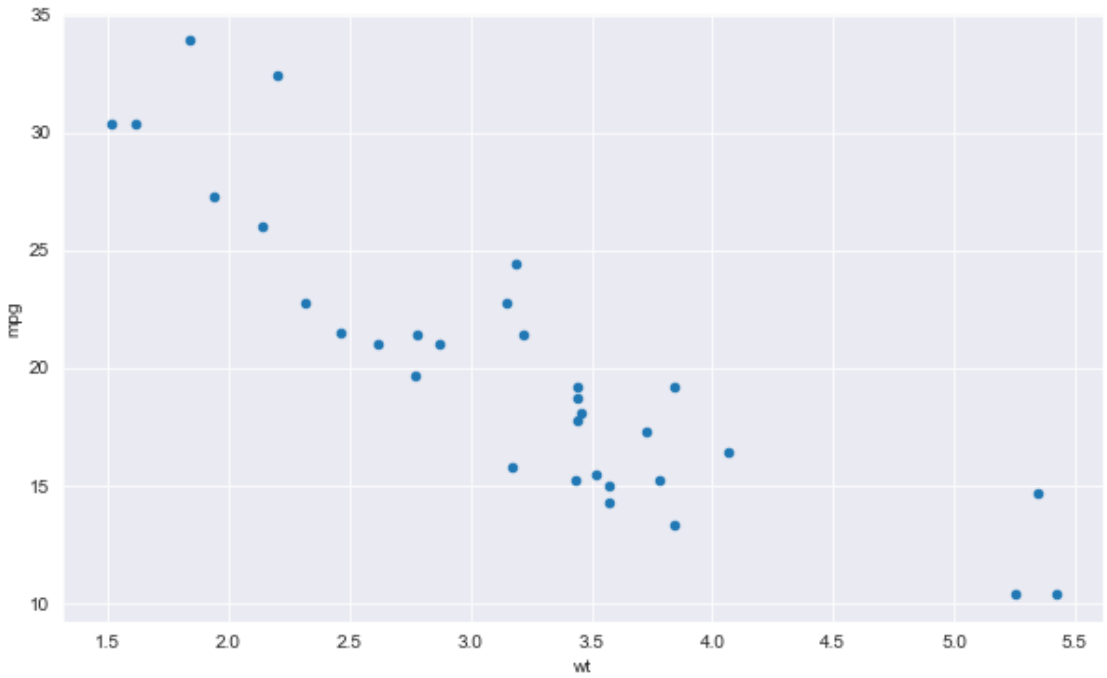
[134]:
```
#Viewing first 5 observations
df.head()
```

[134]:

	model	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
0	Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
1	Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
2	Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
3	Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
4	Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2

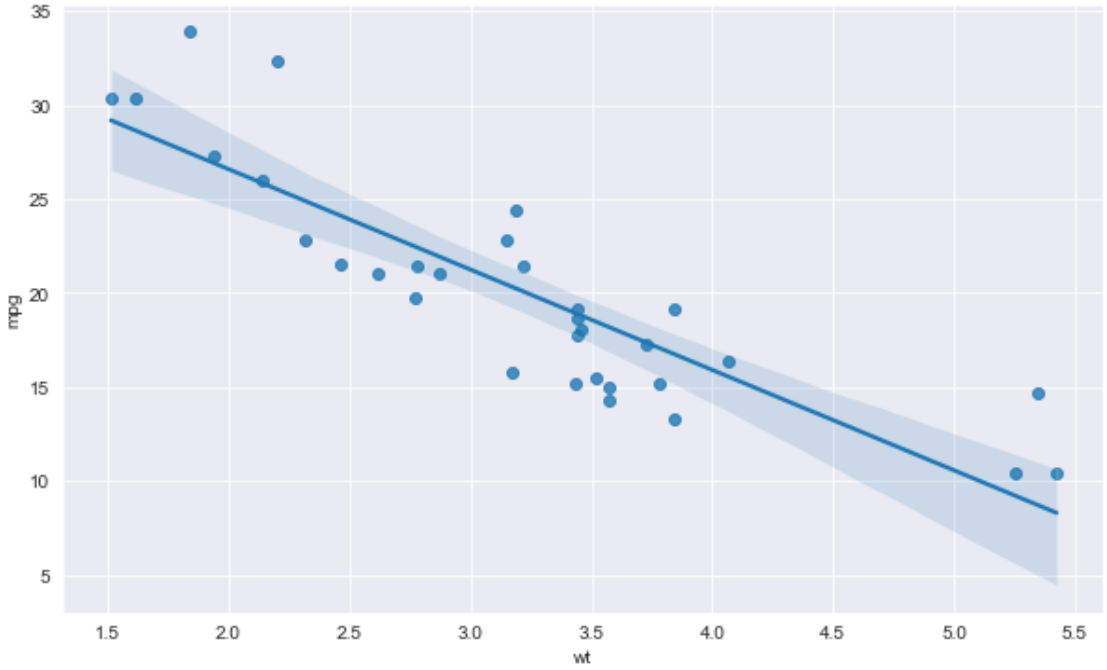
[135]:
```
df.plot.scatter(x='wt', y='mpg')
```

[135]: <AxesSubplot:xlabel='wt', ylabel='mpg'>



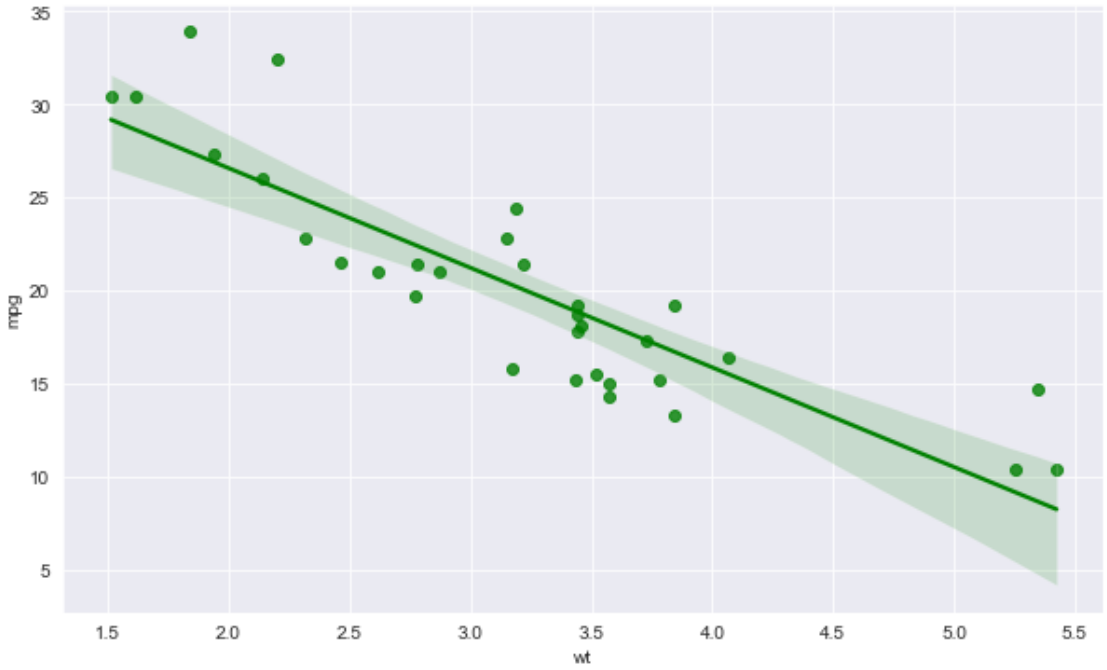
[136]:
```
sns.regplot(x='wt', y='mpg',data=df)
```

[136]: <AxesSubplot:xlabel='wt', ylabel='mpg'>



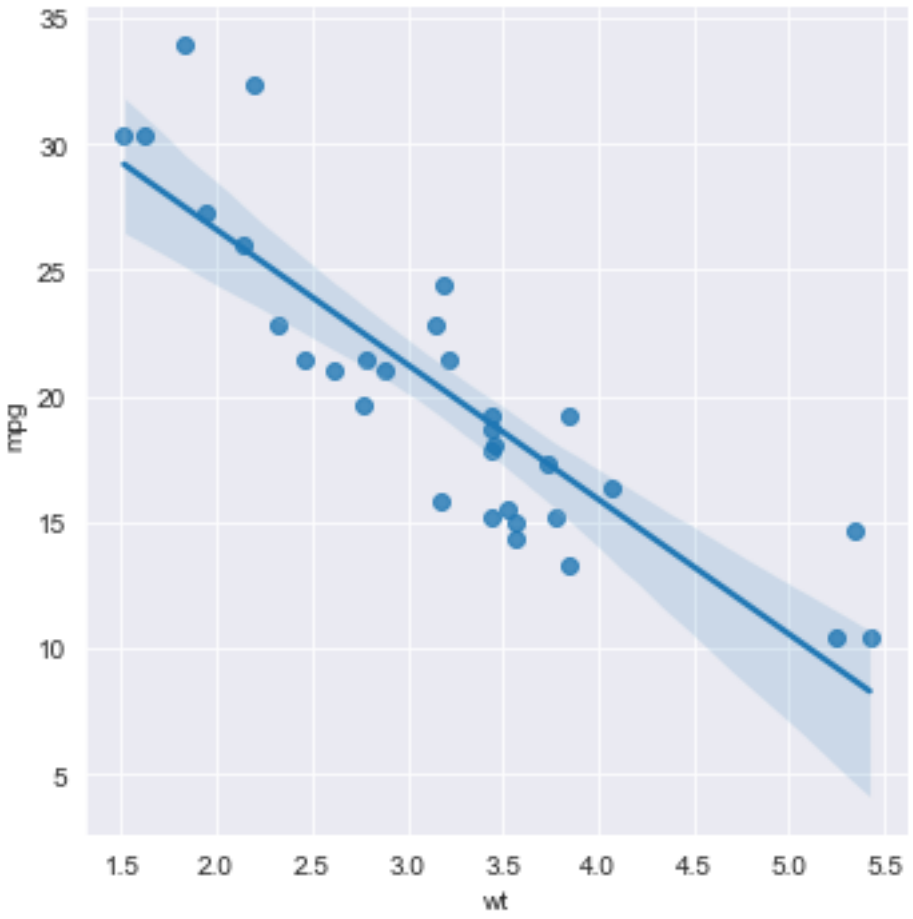
[137]:
```
#changing color
sns.regplot(x='wt', y='mpg',data=df, color='g')
```

[137]: <AxesSubplot:xlabel='wt', ylabel='mpg'>



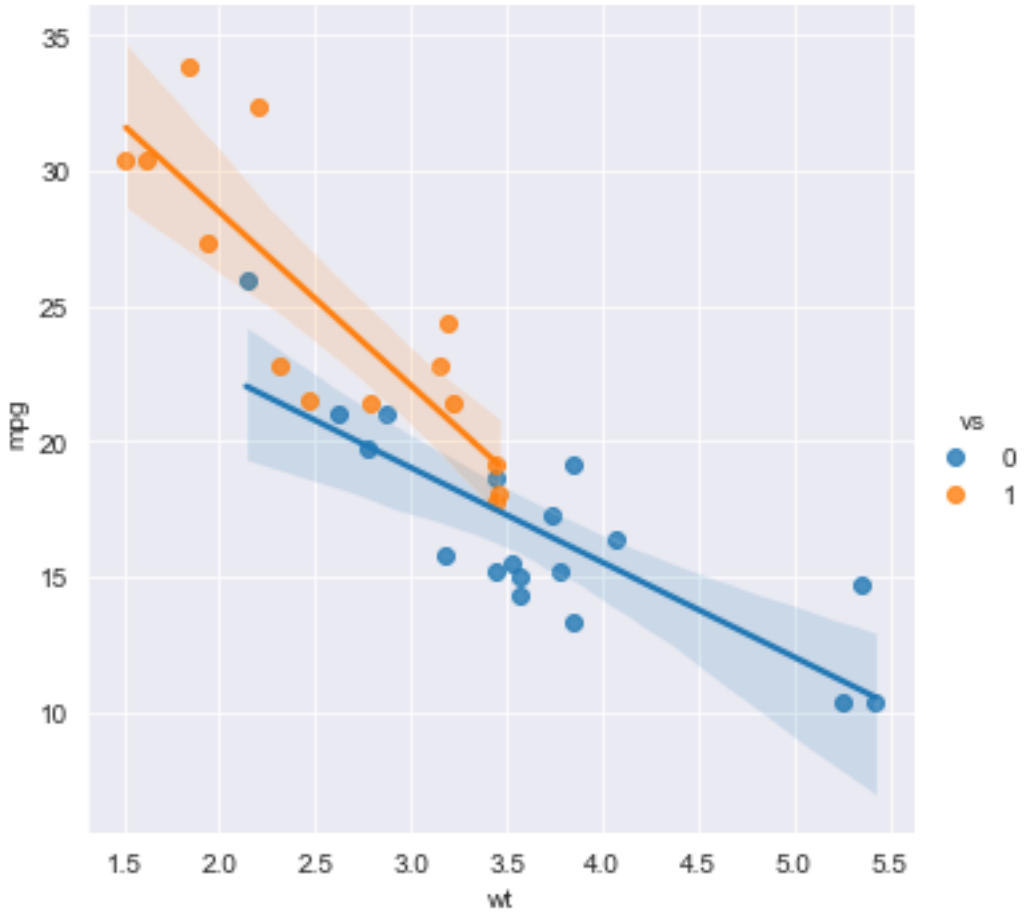
[138]:
```
sns.lmplot(x='wt', y='mpg',data=df)
```

[138]: <seaborn.axisgrid.FacetGrid at 0x1b5683b1d60>



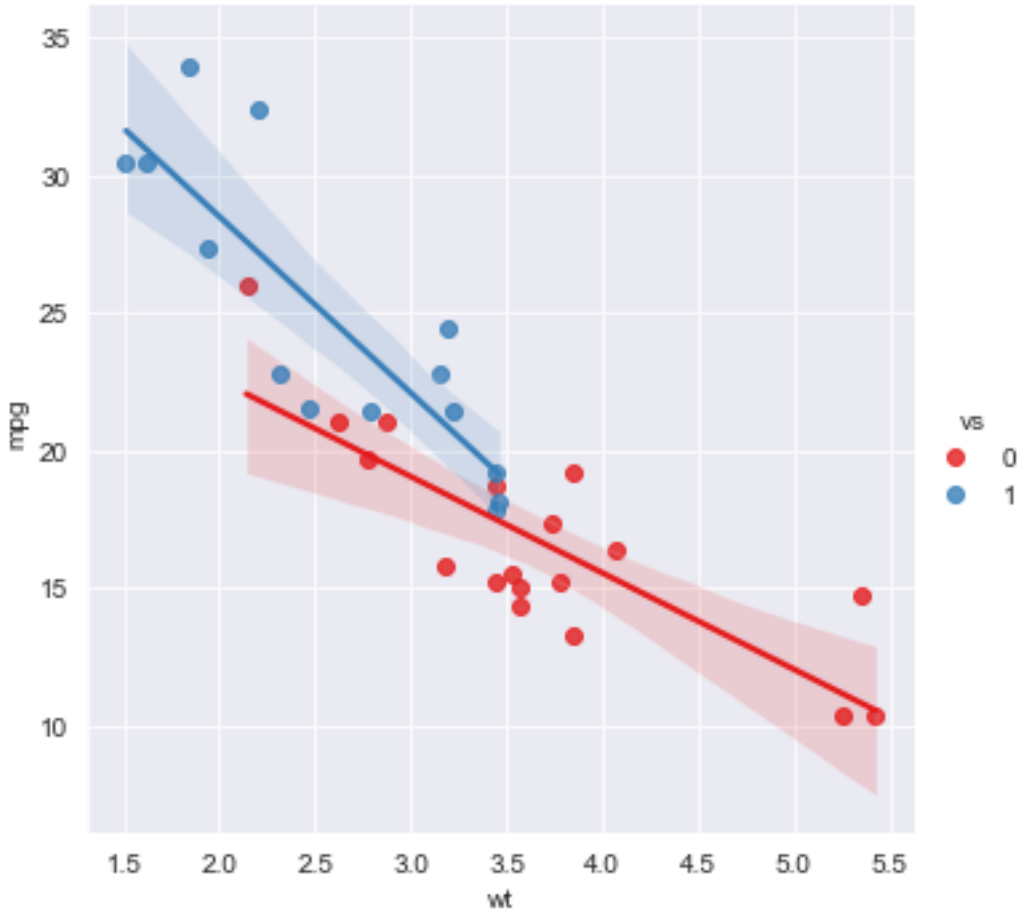
[139]:
```
sns.lmplot(x='wt', y='mpg',hue='vs', data=df)
```

[139]: <seaborn.axisgrid.FacetGrid at 0x1b56840a9a0>



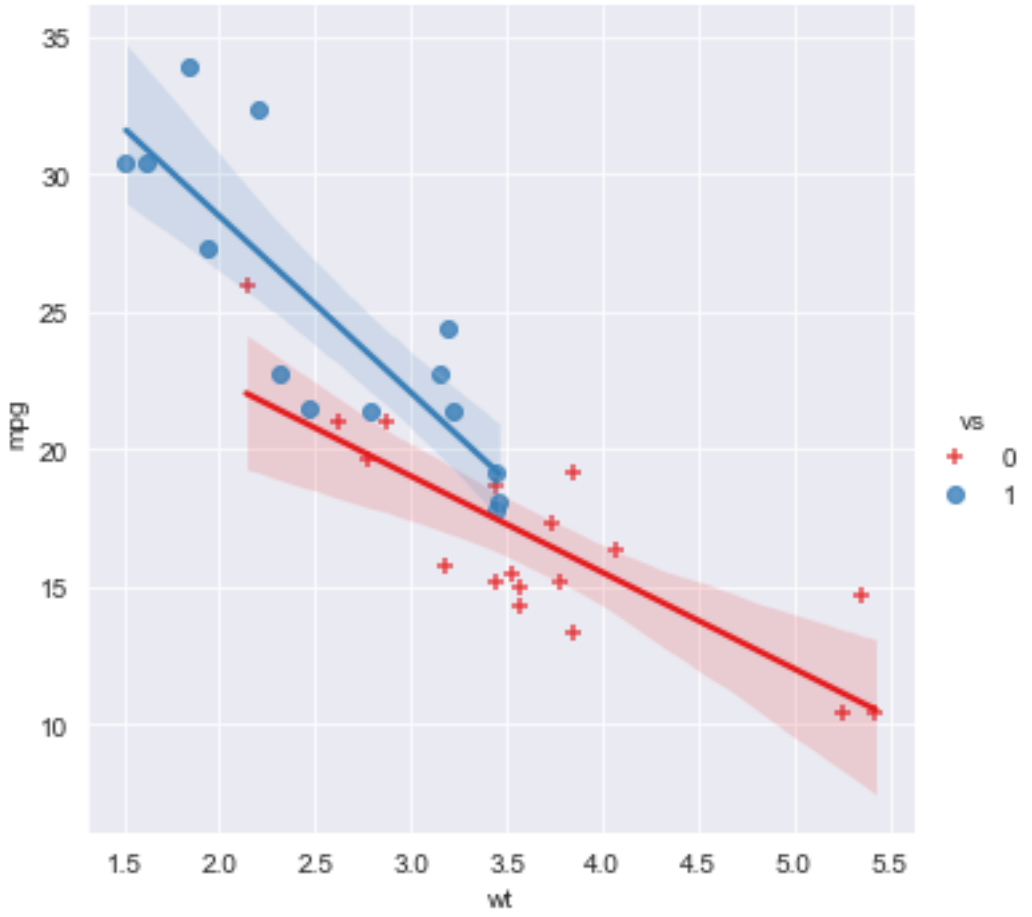
[140]:
```
sns.lmplot(x='wt', y='mpg',hue='vs',palette='Set1', data=df)
```

[140]: <seaborn.axisgrid.FacetGrid at 0x1b568412fa0>



[141]:
```
sns.lmplot(x='wt', y='mpg',hue='vs',markers=['+','o'],palette='Set1', data=df)
```

[141]: <seaborn.axisgrid.FacetGrid at 0x1b5684f3e80>



[142]:
```
# Load the dataset
iris = pd.read_csv('Iris.csv')
```

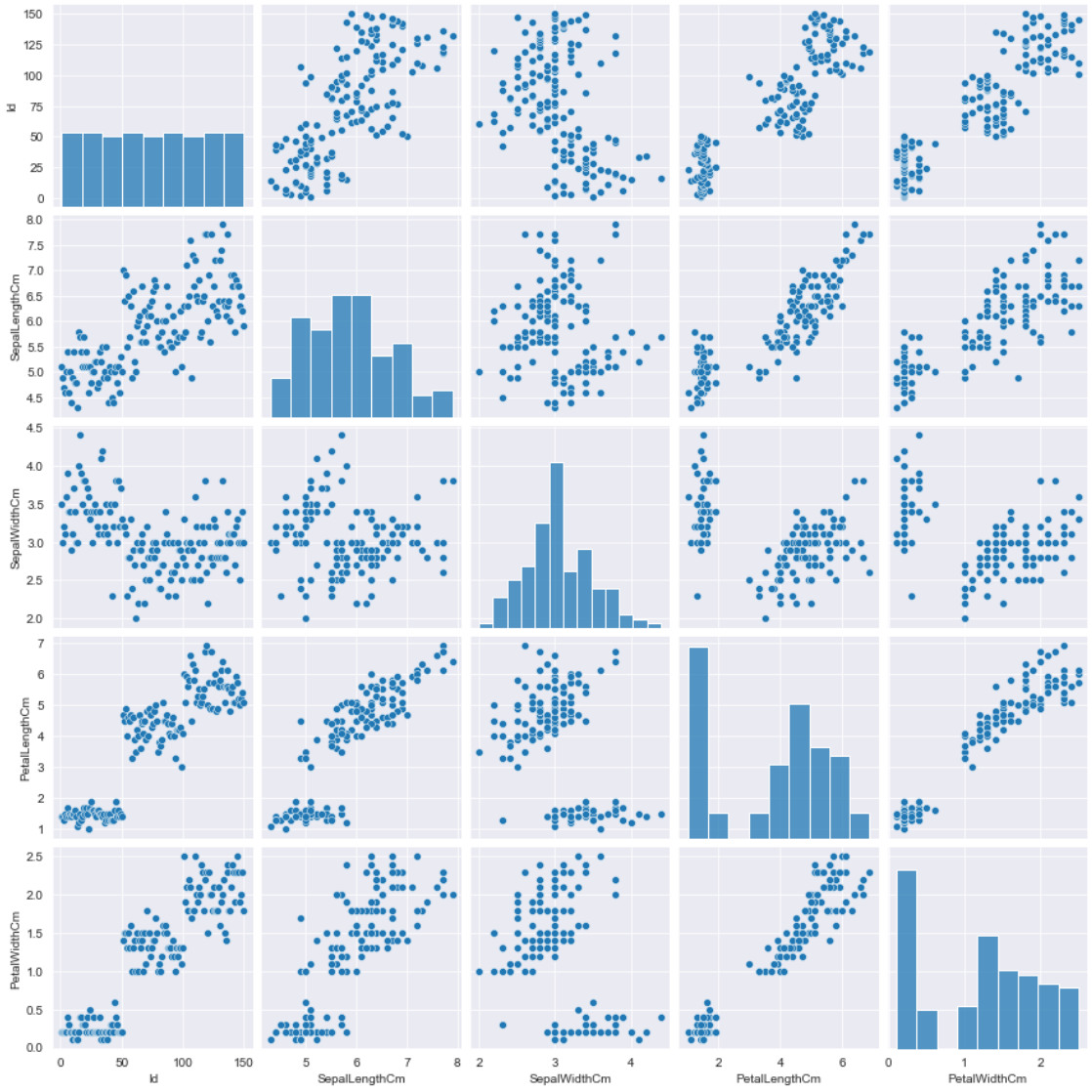
[143]:
```
# viewing top 5 rows
iris.head()
```

[143]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa

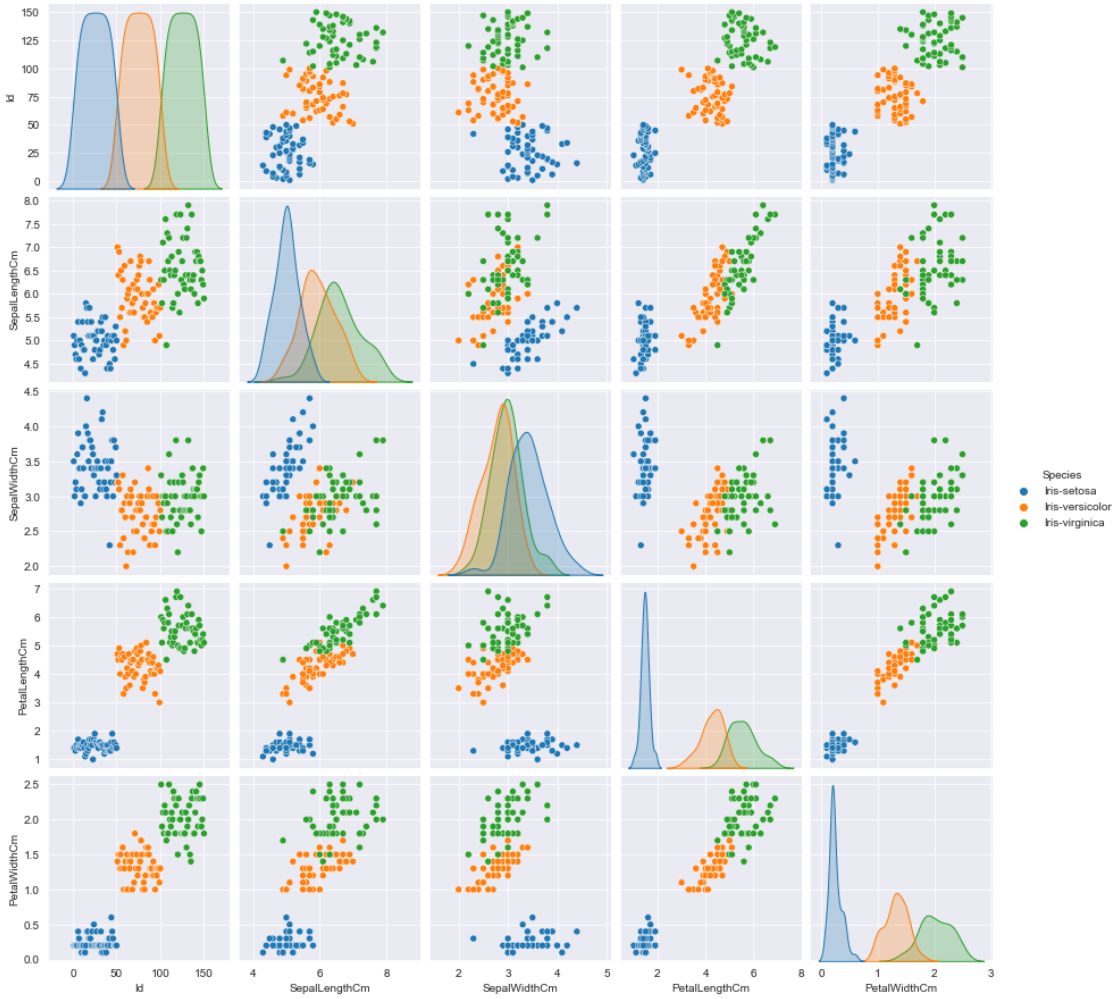
[144]:
```
sns.pairplot(iris)
```

[144]:
```
<seaborn.axisgrid.PairGrid at 0x1b568565c10>
```



[145]:
```
sns.pairplot(iris,hue='Species')
```

[145]: <seaborn.axisgrid.PairGrid at 0x1b56860efd0>



[146]:
```
## Parallel coordinates
from pandas.plotting import parallel_coordinates
## Loading Dataset
df = pd.read_csv('NHANES.csv')
```

[147]:
```
#Top 5 rows
df.head()
```

[147]:

	SEQN	ALQ101	ALQ110	ALQ130	SMQ020	RIAGENDR	RIDAGEYR	RIDRETH1	\
0	83732	1.0	NaN	1.0	1	1	62	3	
1	83733	1.0	NaN	6.0	1	1	53	3	
2	83734	1.0	NaN	NaN	1	1	78	3	
3	83735	2.0	1.0	1.0	2	2	56	3	
4	83736	2.0	1.0	1.0	2	2	42	4	

	DMDCITZN	DMDEDUC2	…	BPXSY2	BPXDI2	BMXWT	BMXHT	BMXBMI	BMXLEG	\

```
0       1.0       5.0  …   124.0    64.0   94.8  184.5    27.8    43.3
1       2.0       3.0  …   140.0    88.0   90.4  171.4    30.8    38.0
2       1.0       3.0  …   132.0    44.0   83.4  170.1    28.8    35.6
3       1.0       5.0  …   134.0    68.0  109.8  160.9    42.4    38.5
4       1.0       4.0  …   114.0    54.0   55.2  164.9    20.3    37.4

   BMXARML  BMXARMC  BMXWAIST  HIQ210
0     43.6     35.9     101.1     2.0
1     40.0     33.2     107.9     NaN
2     37.0     31.0     116.5     2.0
3     37.7     38.3     110.1     2.0
4     36.0     27.2      80.4     2.0

[5 rows x 28 columns]
```

[148]:
```
#columns
df.columns
```

[148]:
```
Index(['SEQN', 'ALQ101', 'ALQ110', 'ALQ130', 'SMQ020', 'RIAGENDR', 'RIDAGEYR',
       'RIDRETH1', 'DMDCITZN', 'DMDEDUC2', 'DMDMARTL', 'DMDHHSIZ', 'WTINT2YR',
       'SDMVPSU', 'SDMVSTRA', 'INDFMPIR', 'BPXSY1', 'BPXDI1', 'BPXSY2',
       'BPXDI2', 'BMXWT', 'BMXHT', 'BMXBMI', 'BMXLEG', 'BMXARML', 'BMXARMC',
       'BMXWAIST', 'HIQ210'],
      dtype='object')
```

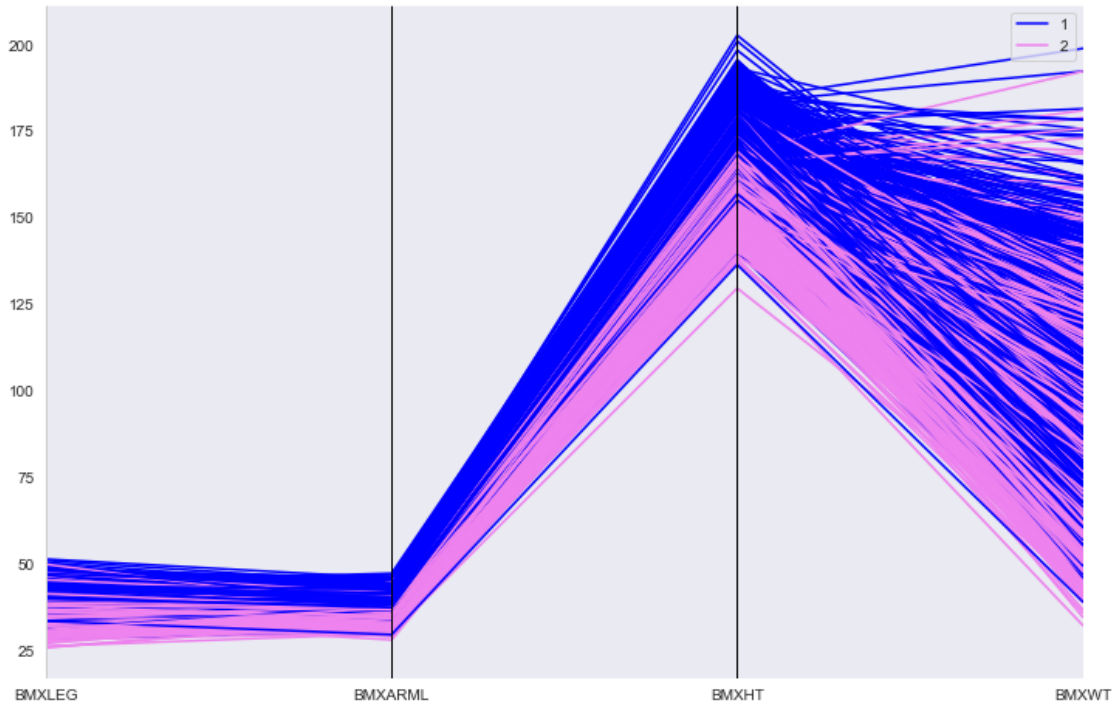
[149]:
```
d = df[['BMXLEG', 'BMXARML','BMXHT','BMXWT','RIAGENDR']]
```

[150]:
```
d.head()
```

[150]:
```
   BMXLEG  BMXARML  BMXHT  BMXWT  RIAGENDR
0    43.3     43.6  184.5   94.8         1
1    38.0     40.0  171.4   90.4         1
2    35.6     37.0  170.1   83.4         1
3    38.5     37.7  160.9  109.8         2
4    37.4     36.0  164.9   55.2         2
```

[151]:
```
#gender based plotting
plt.figure(figsize=(12,8))
parallel_coordinates(d,'RIAGENDR',color=['blue','violet'])
```

[151]:
```
<AxesSubplot:>
```



[152]:
```
#Loading Dataset
df = pd.read_csv('avocado.csv')
```

[153]:
```
df.columns
```

[153]:
```
Index(['Unnamed: 0', 'Date', 'AveragePrice', 'Total Volume', '4046', '4225',
       '4770', 'Total Bags', 'Small Bags', 'Large Bags', 'XLarge Bags', 'type',
       'year', 'region'],
      dtype='object')
```

[154]:
```
df.head()
```

[154]:

	Unnamed: 0	Date	AveragePrice	Total Volume	4046	4225	4770	Total Bags	Small Bags	Large Bags	XLarge Bags	type	year	region
0	0	2015-12-27	1.33	64236.62	1036.74	54454.85	48.16	8696.87	8603.62	93.25	0.0	conventional	2015	Albany
1	1	2015-12-20	1.35	54876.98	674.28	44638.81	58.33	9505.56	9408.07	97.49	0.0	conventional	2015	Albany
2	2	2015-12-13	0.93	118220.22	794.70	109149.67	130.50	8145.35	8042.21	103.14	0.0	conventional	2015	Albany
3	3	2015-12-06	1.08	78992.15	1132.00	71976.41	72.58	5811.16	5677.40	133.76	0.0	conventional	2015	Albany
4	4	2015-11-29	1.28	51039.60	941.48	43838.39								

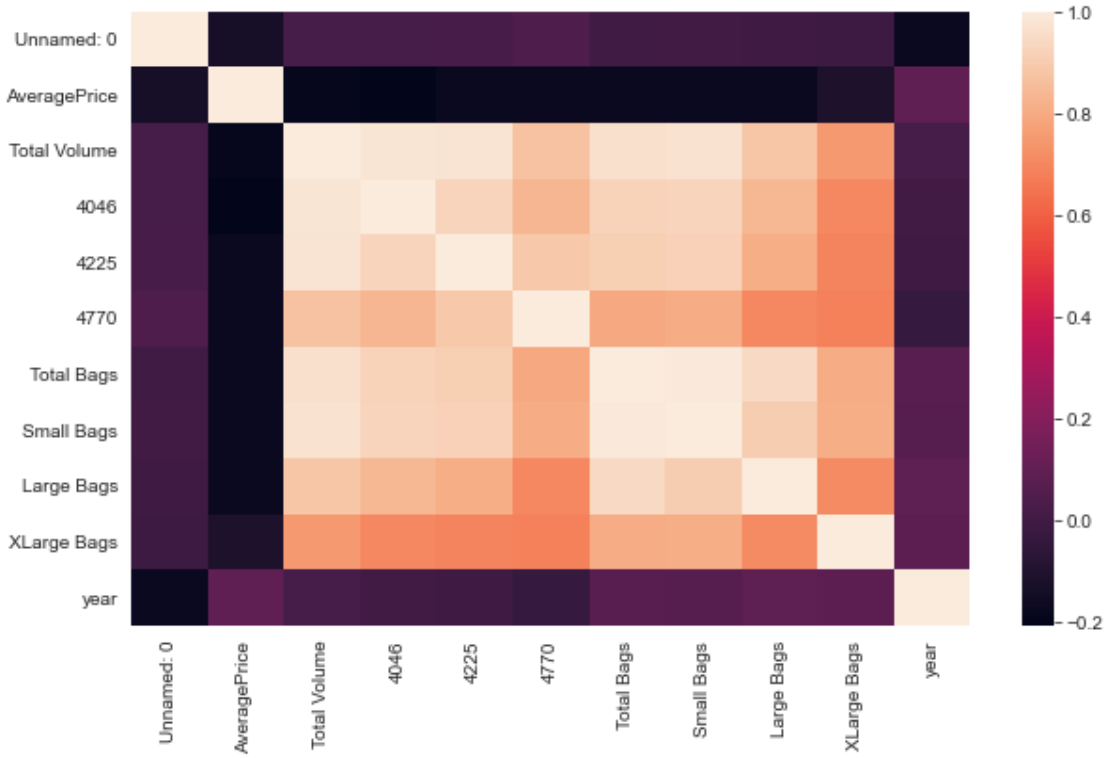
```
4   75.78     6183.95     5986.26      197.69          0.0  conventional

   year  region
0  2015  Albany
1  2015  Albany
2  2015  Albany
3  2015  Albany
4  2015  Albany
```

[155]:
```
df.dtypes
```

[155]:
```
Unnamed: 0        int64
Date             object
AveragePrice    float64
Total Volume    float64
4046            float64
4225            float64
4770            float64
Total Bags      float64
Small Bags      float64
Large Bags      float64
XLarge Bags     float64
type             object
year              int64
region           object
dtype: object
```

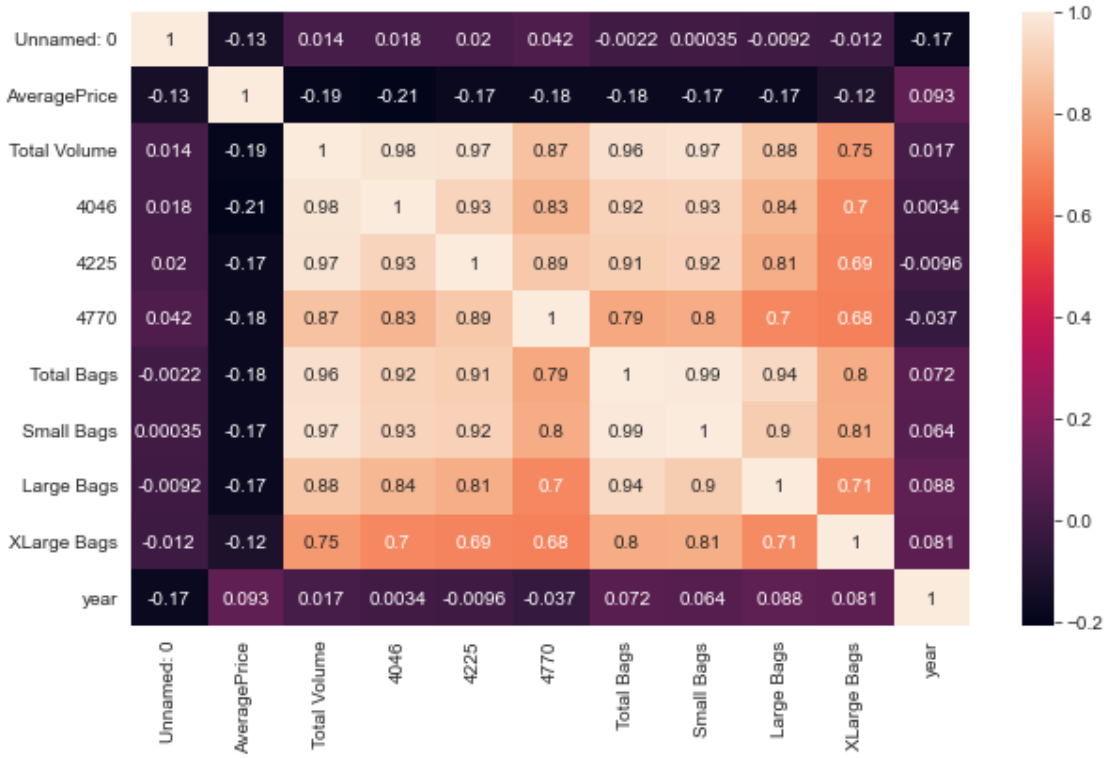
[156]:
```
sns.heatmap(df.corr())
```

[156]:
```
<AxesSubplot:>
```



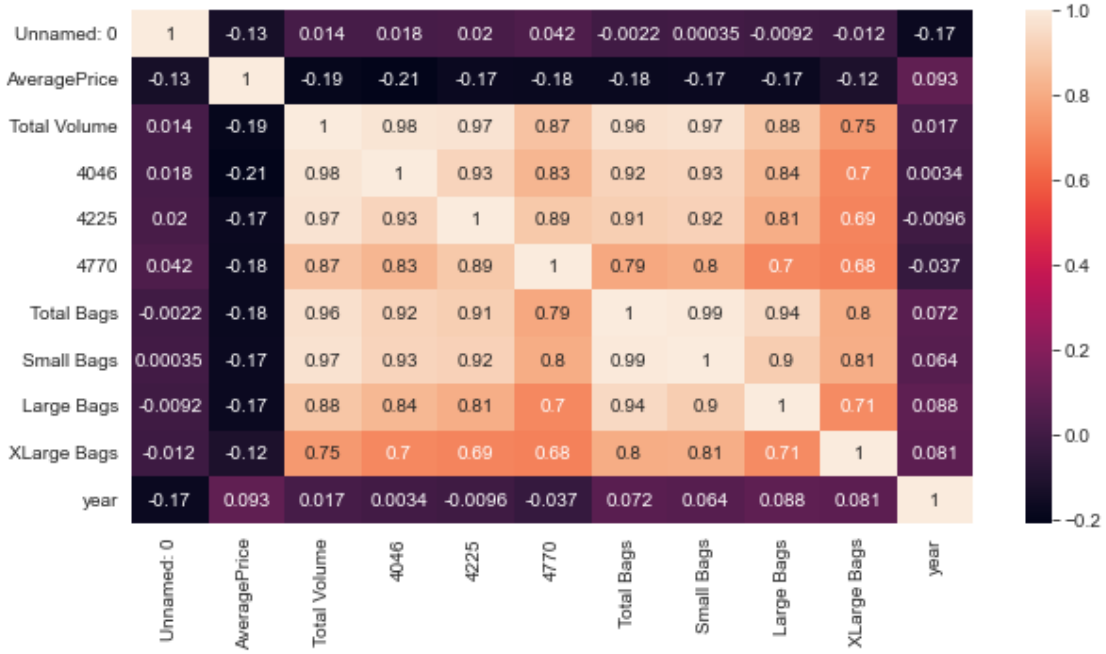
[157]:
```
sns.heatmap(df.corr(), annot =True)
```

[157]: <AxesSubplot:>



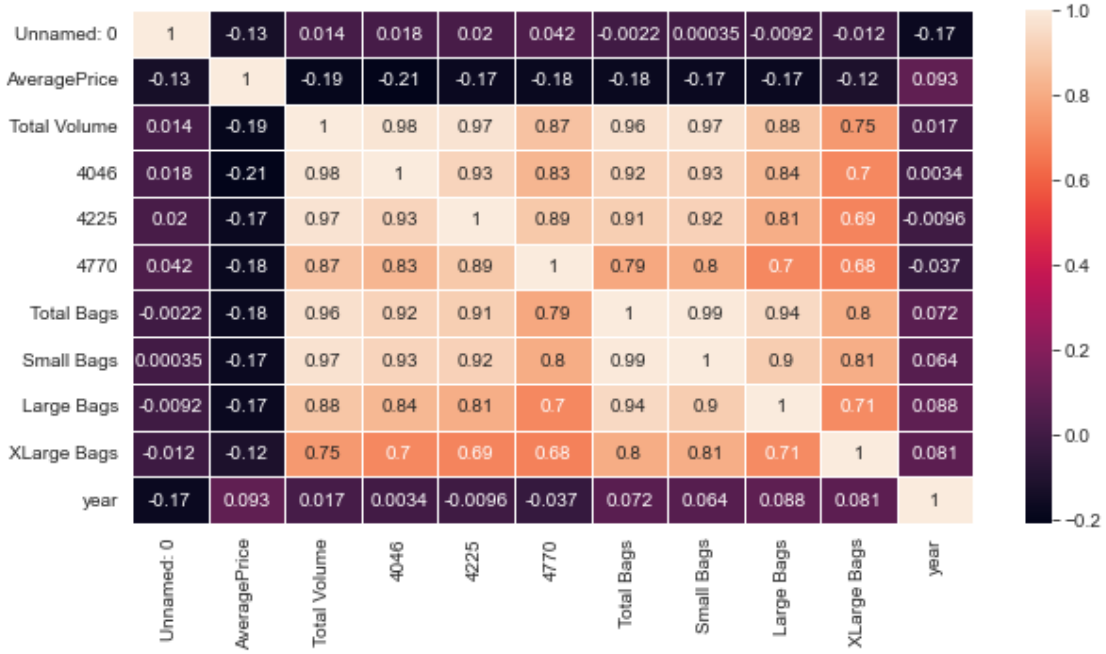
[158]:
```
plt.figure(figsize=(10,5))
sns.heatmap(df.corr(), annot =True)
```

[158]: <AxesSubplot:>



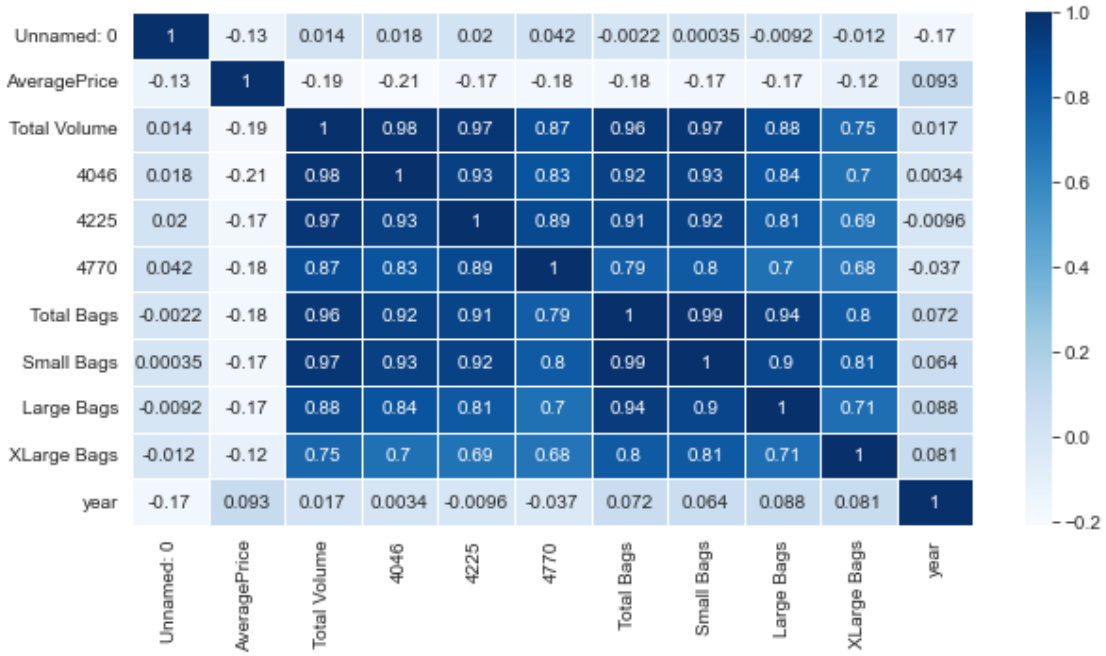
[159]:
```
plt.figure(figsize=(10,5))
sns.heatmap(df.corr(), annot =True,linewidth = 0.5)
```

[159]: <AxesSubplot:>



[160]:
```
plt.figure(figsize=(10,5))
sns.heatmap(df.corr(), annot =True,linewidth = 0.5, cmap='Blues')
```

[160]: <AxesSubplot:>



1.12 Refer to below Link for the datasets:

https://drive.google.com/drive/folders/1QZxDigr3kJCTjtDBRvbIujSsiR9E3Nak?usp=sharing

1.13 Refer to below link for "How to choose the right chart"

https://towardsdatascience.com/data-visualization-how-to-choose-the-right-chart-part-1-d4c550085ea7

[ ]: