PROGRAM NO:3

AIM:Programs using matplotlib / plotly / bokeh / seaborn for data visualisation

In [ ]:

```
import matplotlib.pyplot as plt
import numpy as np
x=np.linspace(0,10,11)
y=x ** 3
x
```

Out[ ]:

```
array([ 0.,  1.,  2.,  3.,  4.,  5.,  6.,  7.,  8.,  9., 10.])
```

In [ ]:

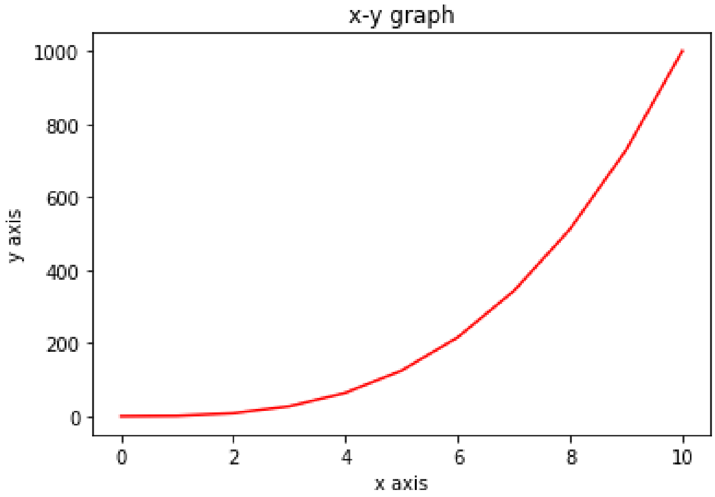
```
y
```

Out[ ]:

```
array([   0.,    1.,    8.,   27.,   64.,  125.,  216.,  343.,  512.,
        729., 1000.])
```

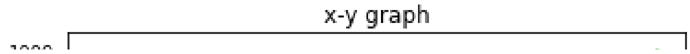
In [ ]:

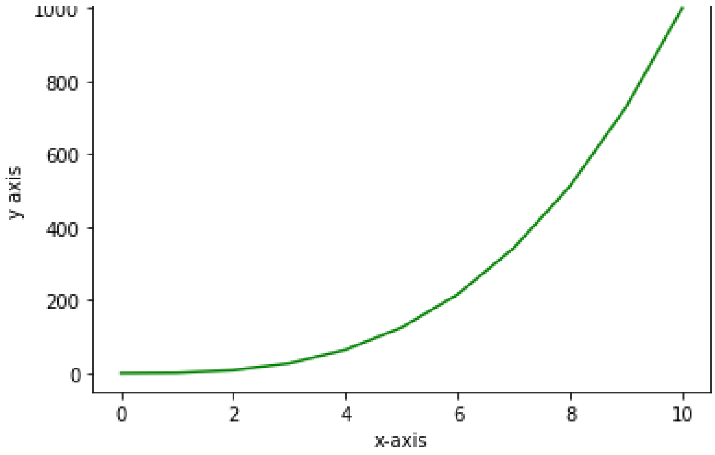
```
plt.plot(x,y,'red')
plt.xlabel("x axis")
plt.ylabel("y axis")
plt.title("x-y graph")
plt.show()
```



In [ ]:

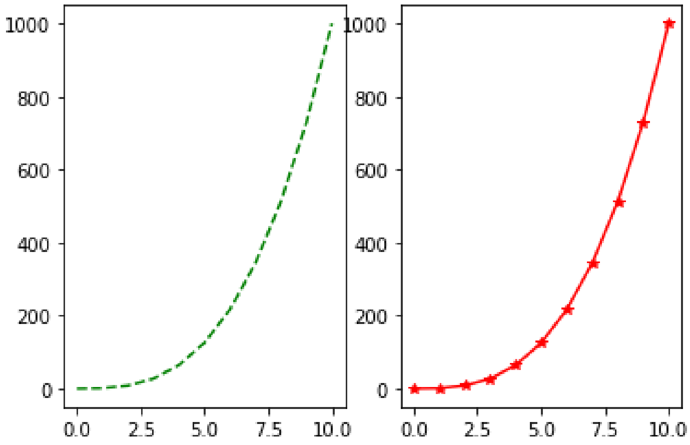
```
plt.plot(x,y,'g')
plt.xlabel("x-axis")
plt.ylabel("y axis")
plt.title("x-y graph")
plt.show()
```





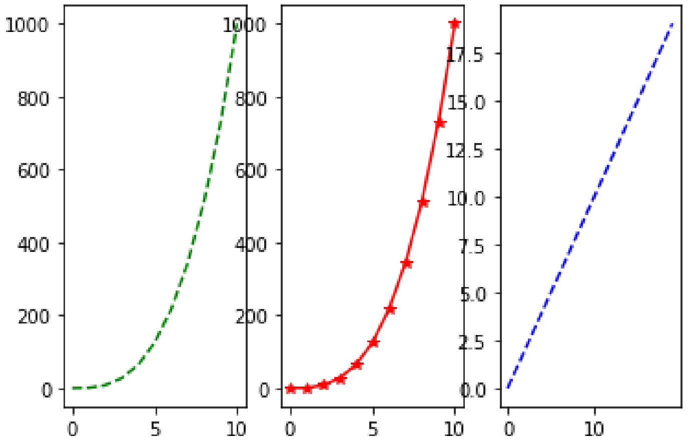
In [ ]:

```
plt.subplot(1,2,1)
plt.plot(x,y,'g--')
plt.subplot(1,2,2)
plt.plot(x,y,'r*-')
plt.show()
```



In [ ]:

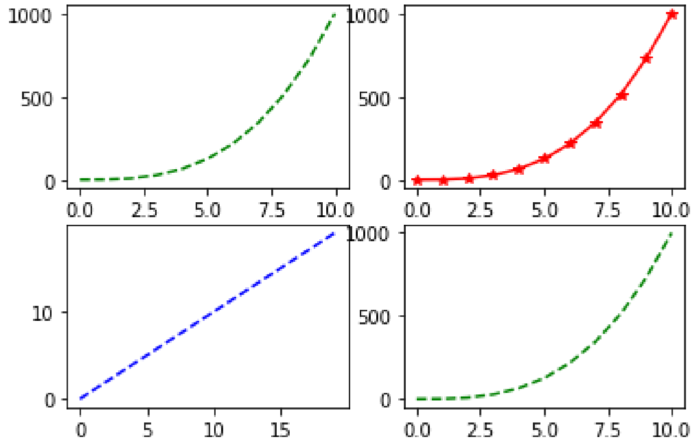
```
t=np.arange(0,20)
d=np.arange(0,20)
plt.subplot(1,3,1)
plt.plot(x,y,'g--')
plt.subplot(1,3,2)
plt.plot(x,y,'r*-')
plt.subplot(1,3,3)
plt.plot(t,d,'b--')
plt.show()
```



In [ ]:

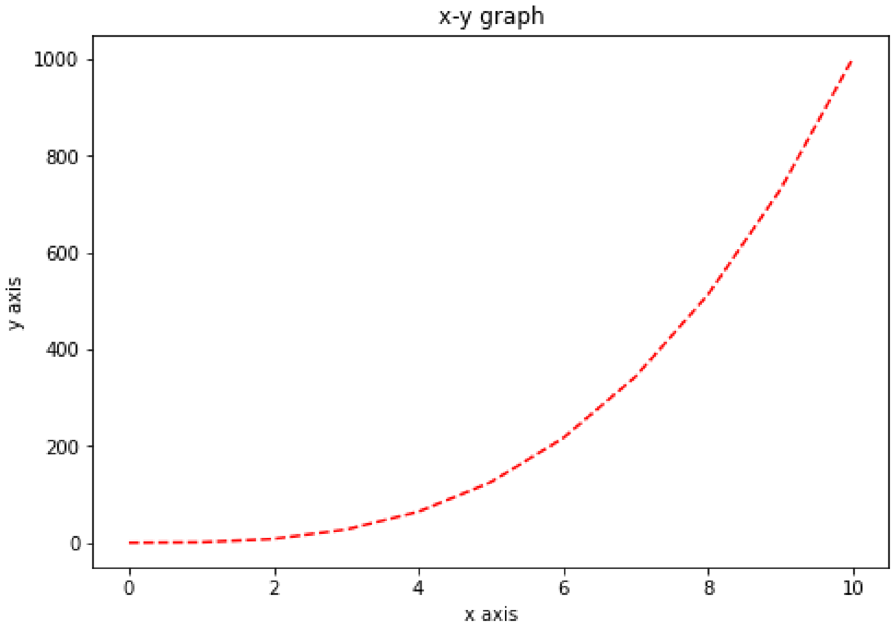
```
t=np.arange(0,20)
d=np.arange(0,20)
```

```
plt.subplot(2,2,1)
plt.plot(x,y,'g--')
plt.subplot(2,2,2)
plt.plot(x,y,'r*-')
plt.subplot(2,2,3)
plt.plot(t,d,'b--')
plt.subplot(2,2,4)
plt.plot(x,y,'g--')
plt.show()
```



In [ ]:

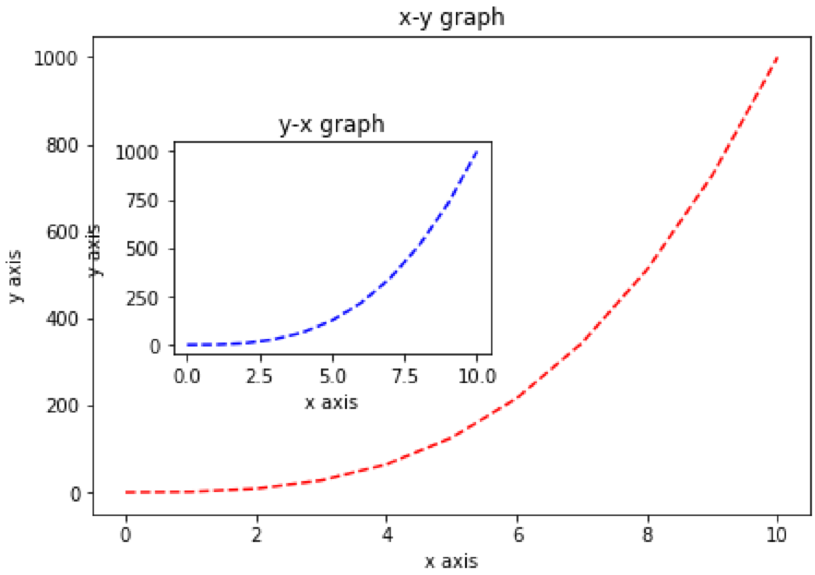
```
# using object oriented method
fig=plt.figure() #empty canvas
axes=fig.add_axes([2,2,1,1])   # add set of axes to figure
axes.plot(x,y,'r--')
axes.set_xlabel('x axis')
axes.set_ylabel('y axis')
axes.set_title("x-y graph")
plt.show()
```



In [ ]:

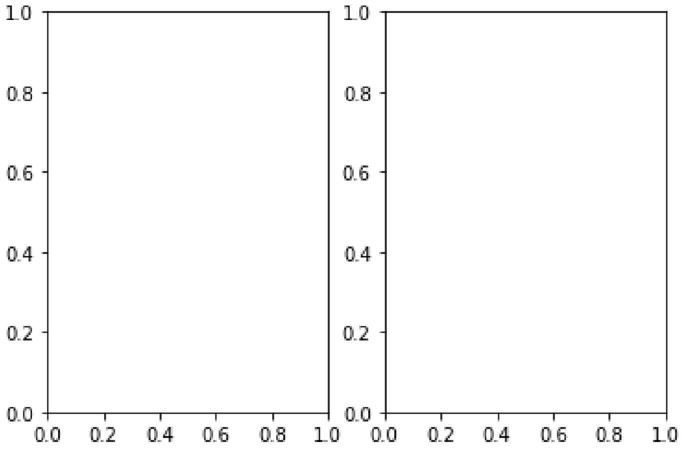
```
fig=plt.figure() #empty canvas
axes1=fig.add_axes([0.3,0.3,0.9,0.9])
axes2=fig.add_axes([0.4,0.6,0.4,0.4])   # add set of axes to figure
#larger one
axes1.plot(x,y,'r--')
axes1.set_xlabel('x axis')
axes1.set_ylabel('y axis')
axes1.set_title("x-y graph")
#smaller one
axes2.plot(x,y,'b--')
axes2.set_xlabel('x axis')
```

```
axes2.set_ylabel('y axis')
axes2.set_title("y-x graph")
plt.show()
```



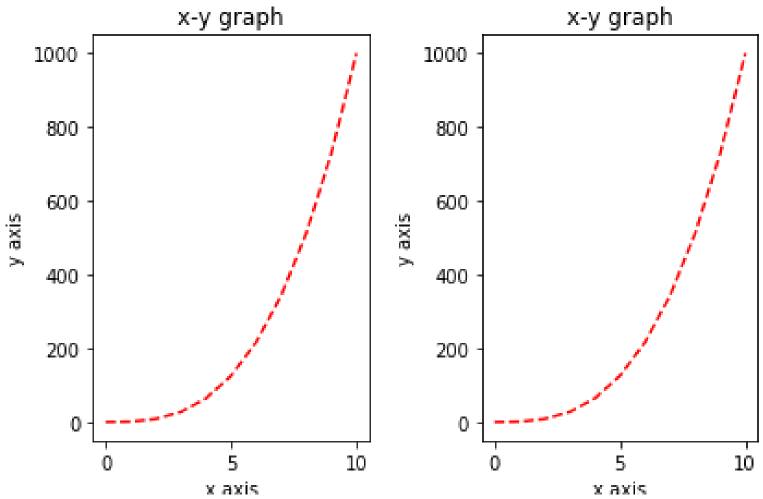
In [ ]:

```
fig,axes=plt.subplots(nrows=1,ncols=2)
```



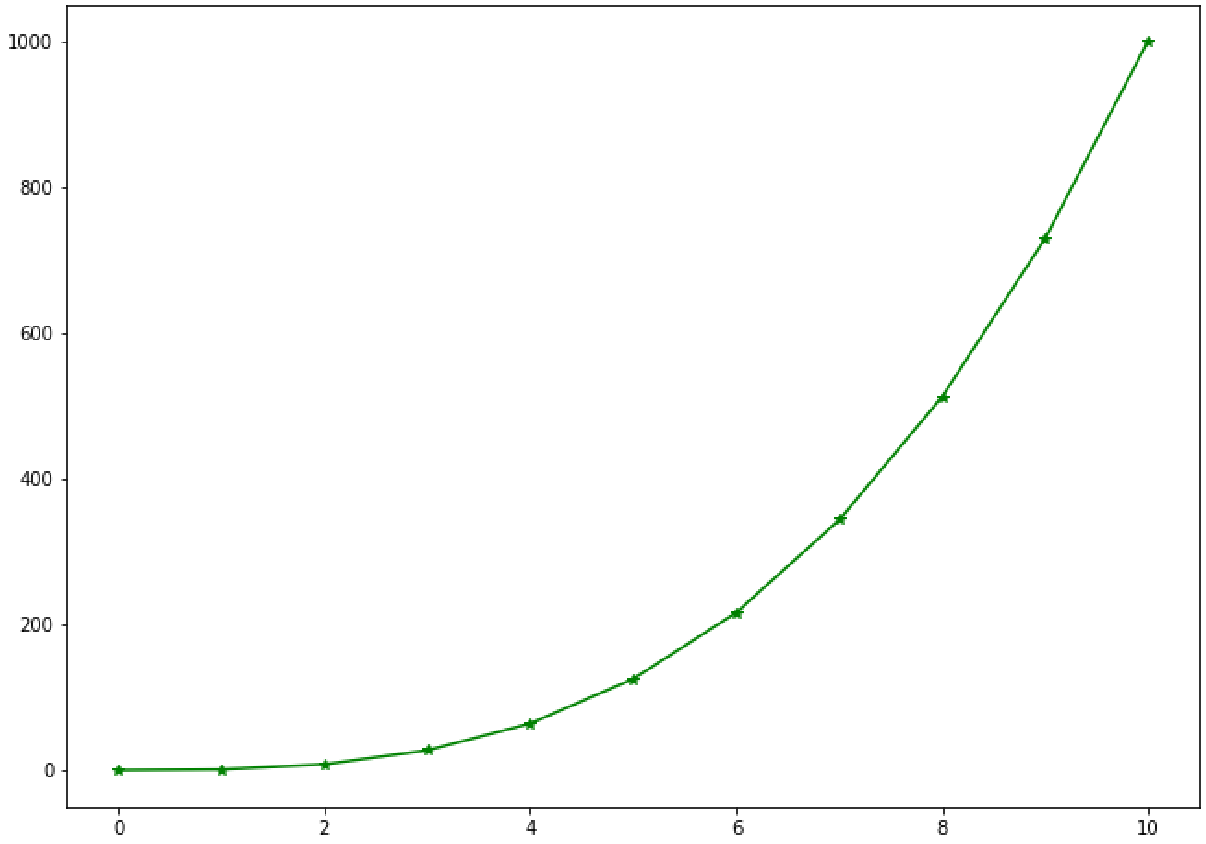
In [ ]:

```
# use similar to plt.figure() except use tuple unpacking to grab fig and axes
fig,axes=plt.subplots(nrows=1,ncols=2)
# iterate through this array
for ax in axes:
  ax.plot(x,y,'r--')   # use axes object to add stuff to plot
  ax.set_xlabel('x axis')
  ax.set_ylabel('y axis')
  ax.set_title("x-y graph")
fig.tight_layout()
```



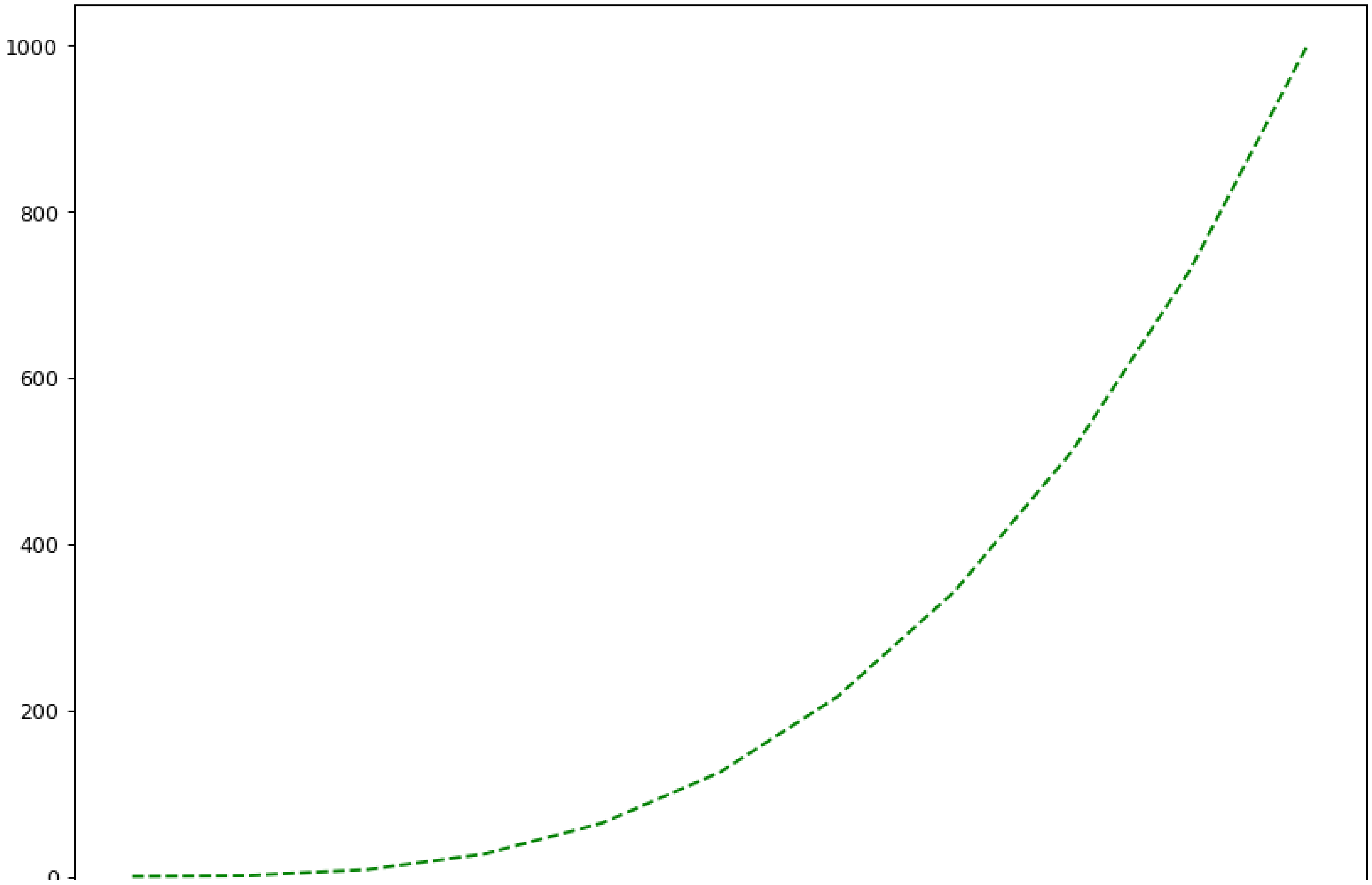
In [ ]:

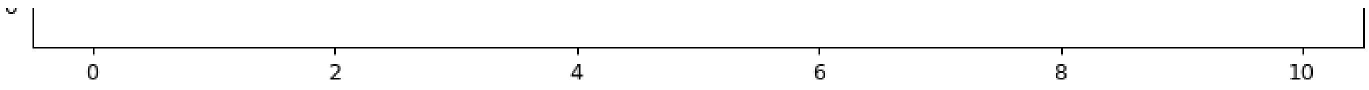
```
fig,axes=plt.subplots(figsize=(11,8)) #width and height
axes.plot(x,y,'g*-')
fig.show()
```



In [ ]:

```
fig,axes=plt.subplots(figsize=(11,8),dpi=90) #width and height
axes.plot(x,y,'g--')
fig.show()
```



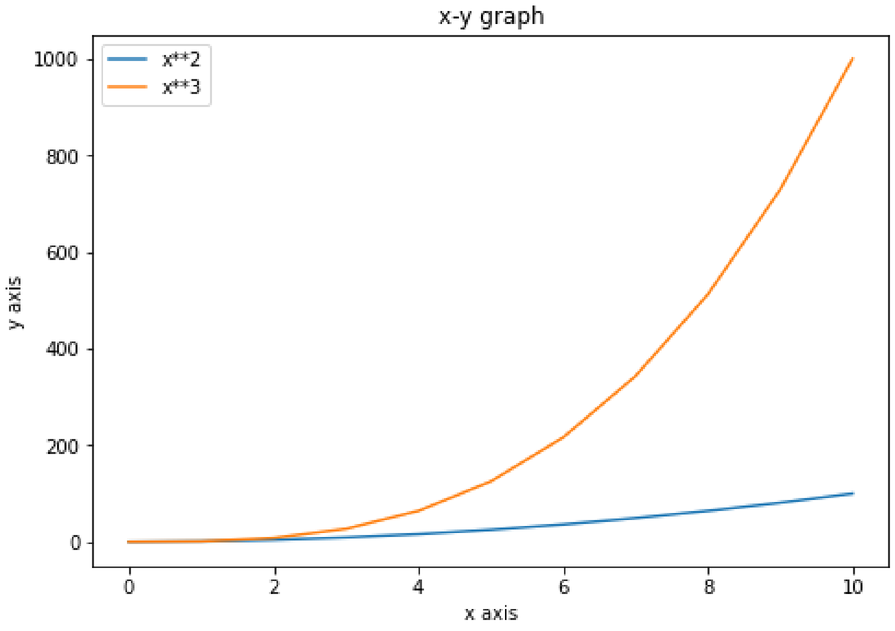


In [ ]:

```
fig.savefig("filename1.png") # save figures
```

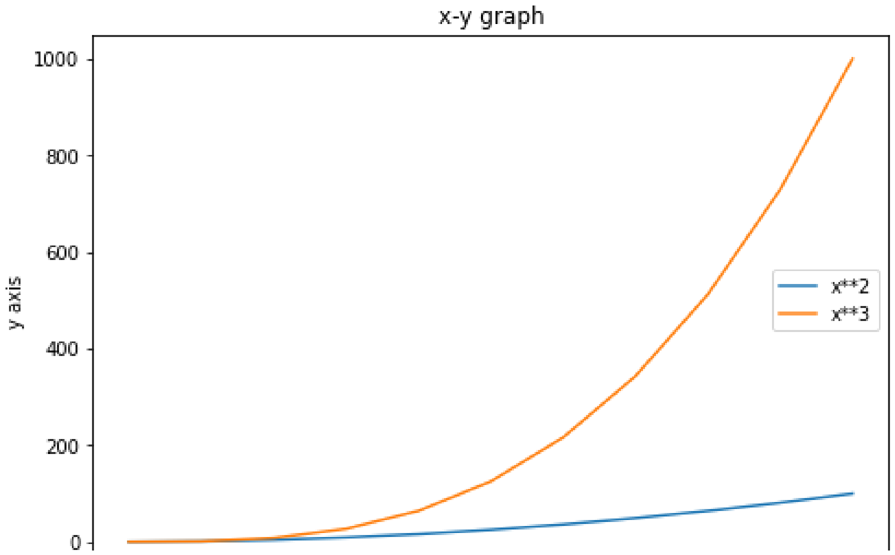
In [ ]:

```
fig=plt.figure() #empty canvas
axes=fig.add_axes([2,2,1,1])  # add set of axes to figure
axes.plot(x,x**2,label="x**2")
axes.plot(x,x**3,label="x**3")
axes.set_xlabel('x axis')
axes.set_ylabel('y axis')
axes.set_title("x-y graph")
axes.legend() #legend function
plt.show()
```



In [ ]:

```
fig=plt.figure() #empty canvas
axes=fig.add_axes([2,2,1,1])  # add set of axes to figure
axes.plot(x,x**2,label="x**2")
axes.plot(x,x**3,label="x**3")
axes.set_xlabel('x axis')
axes.set_ylabel('y axis')
axes.set_title("x-y graph")
axes.legend(loc=7) #legend function with loc
plt.show()
```



In [ ]:

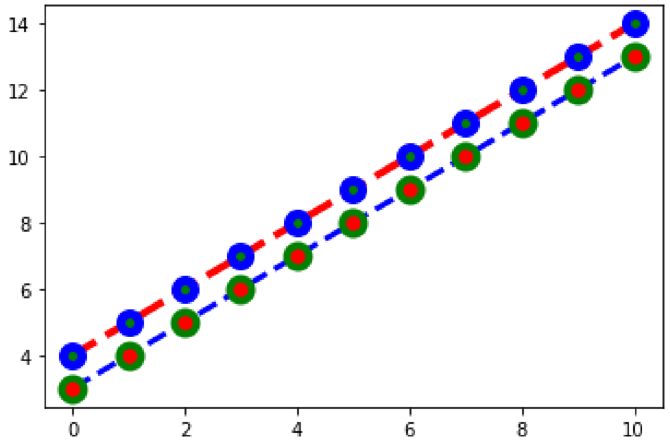
```
import matplotlib.pyplot as plt
import numpy as np
```

In [ ]:

```
plt.plot(x,x+3,color='b',lw=3,ls='-',marker='o',markersize=12,linestyle='dashed',markere
dgecolor='green',markeredgewidth=4,markerfacecolor='red')
plt.plot(x,x+4,color='r',lw=4,ls='-',marker='o',markersize=10,linestyle='dashed',markere
dgecolor='blue',markeredgewidth=5,markerfacecolor='green')

plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: MatplotlibDeprecationWarn
ing: Saw kwargs ['ls', 'linestyle'] which are all aliases for 'linestyle'.  Kept value fr
om 'linestyle'.  Passing multiple aliases for the same property will raise a TypeError in
3.3.
  """Entry point for launching an IPython kernel.
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: MatplotlibDeprecationWarn
ing: Saw kwargs ['ls', 'linestyle'] which are all aliases for 'linestyle'.  Kept value fr
om 'linestyle'.  Passing multiple aliases for the same property will raise a TypeError in
3.3.
```



SEABORN

In [ ]:

```
import seaborn as s
dataset=s.load_dataset('tips')
dataset.head(10)
```

Out[ ]:

	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
5	25.29	4.71	Male	No	Sun	Dinner	4
6	8.77	2.00	Male	No	Sun	Dinner	2
7	26.88	3.12	Male	No	Sun	Dinner	4
8	15.04	1.96	Male	No	Sun	Dinner	2

	total_bill	tip	sex	smoker	day	time	size
9	14.78	3.23	Male	No	Sun	Dinner	2

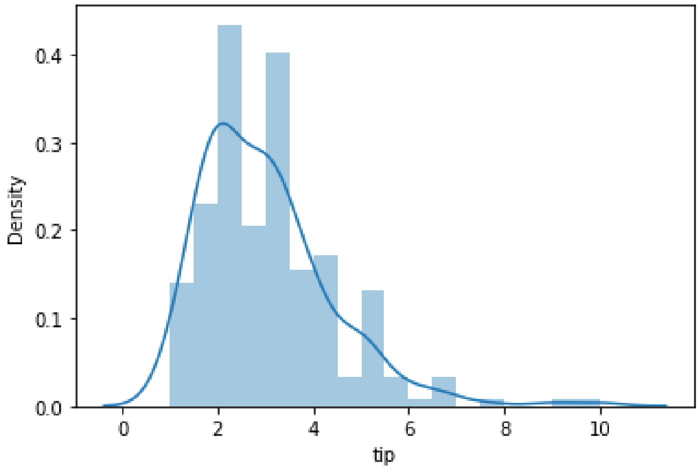
In [ ]:

```
s.distplot(dataset['tip'])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `dis
tplot` is a deprecated function and will be removed in a future version. Please adapt you
r code to use either `displot` (a figure-level function with similar flexibility) or `his
tplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa754183950>
```



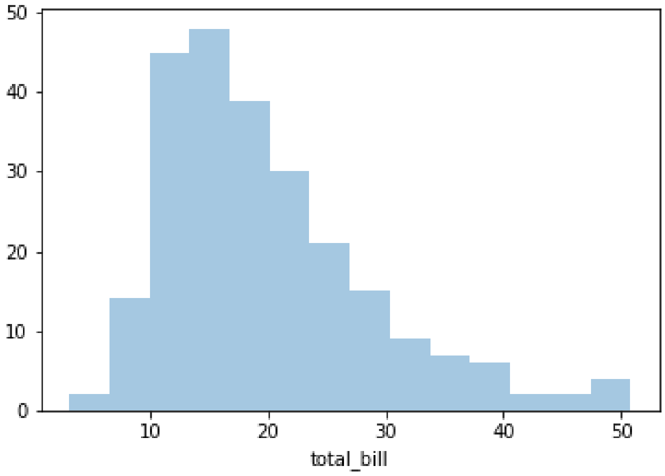
In [ ]:

```
s.distplot(dataset['total_bill'],kde=False)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `dis
tplot` is a deprecated function and will be removed in a future version. Please adapt you
r code to use either `displot` (a figure-level function with similar flexibility) or `his
tplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa751414550>
```



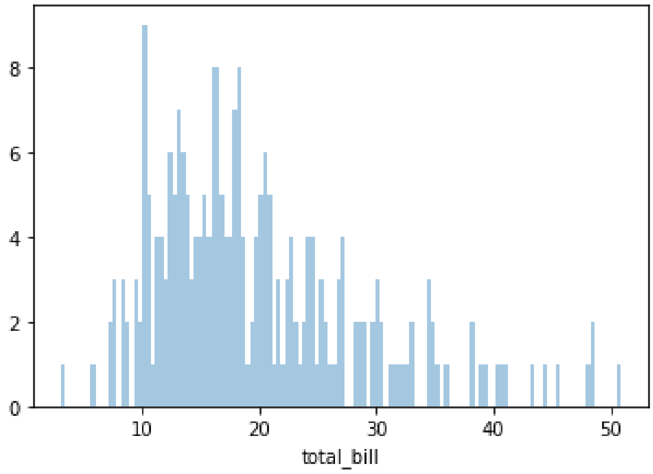
In [ ]:

```
s.distplot(dataset['total_bill'],kde=False,bins=130)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `dis
tplot` is a deprecated function and will be removed in a future version. Please adapt you
r code to use either `displot` (a figure-level function with similar flexibility) or `his
tplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa75353ac50>
```

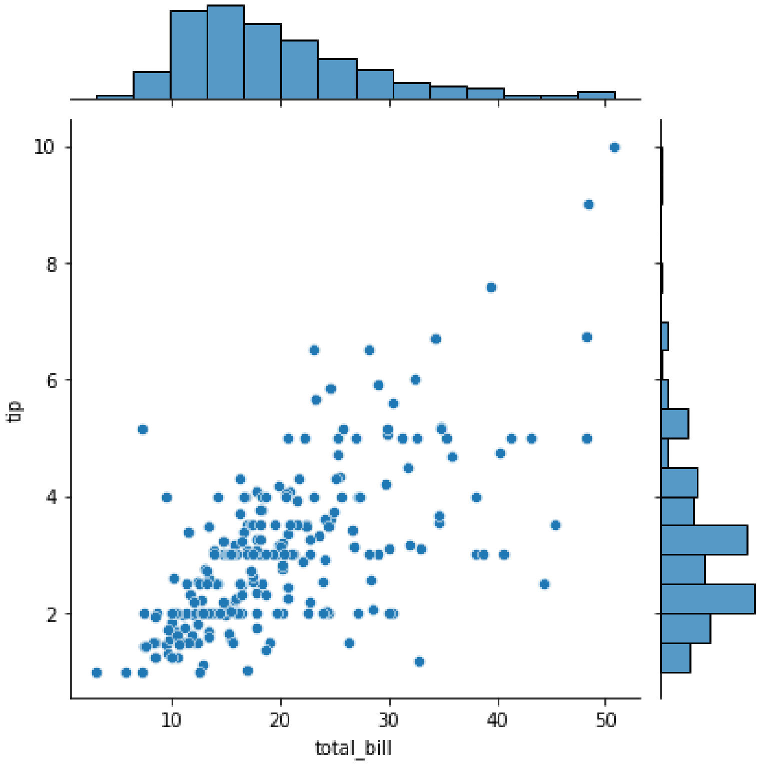


In [ ]:

```
s.jointplot(x='total_bill',y='tip',data=dataset,kind='scatter')
```

Out[ ]:

```
<seaborn.axisgrid.JointGrid at 0x7fa754183e90>
```

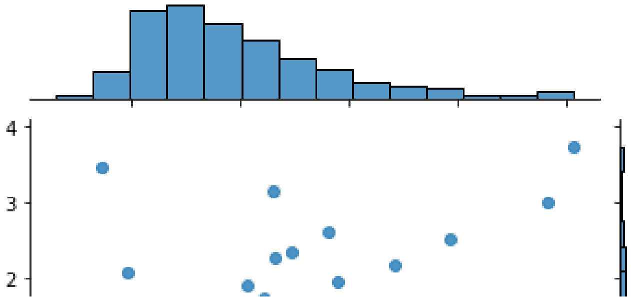


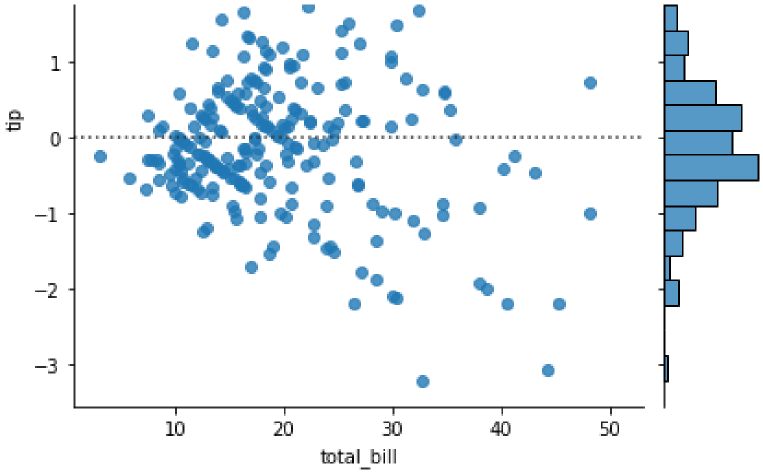
In [ ]:

```
s.jointplot(x='total_bill',y='tip',data=dataset,kind='resid')
```

Out[ ]:

```
<seaborn.axisgrid.JointGrid at 0x7fa75102da10>
```



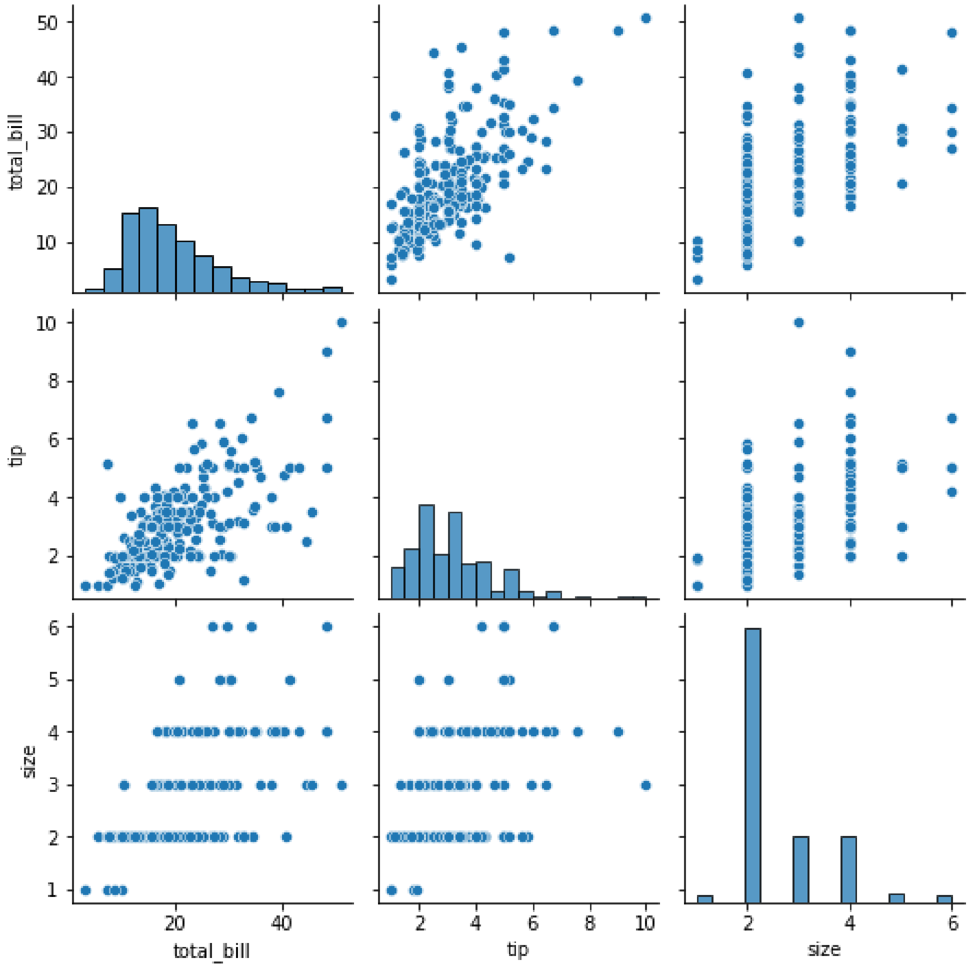


In [ ]:

```
s.pairplot(dataset)
```

Out[ ]:

```
<seaborn.axisgrid.PairGrid at 0x7fa750e8ecd0>
```

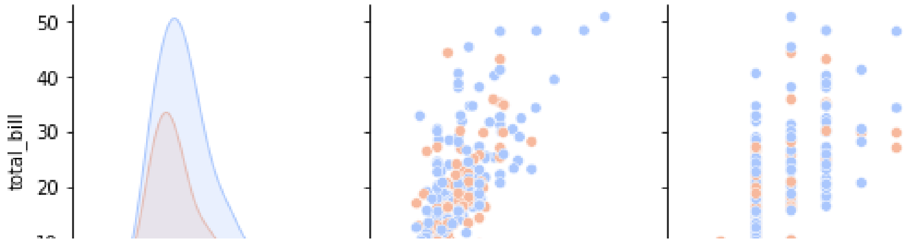


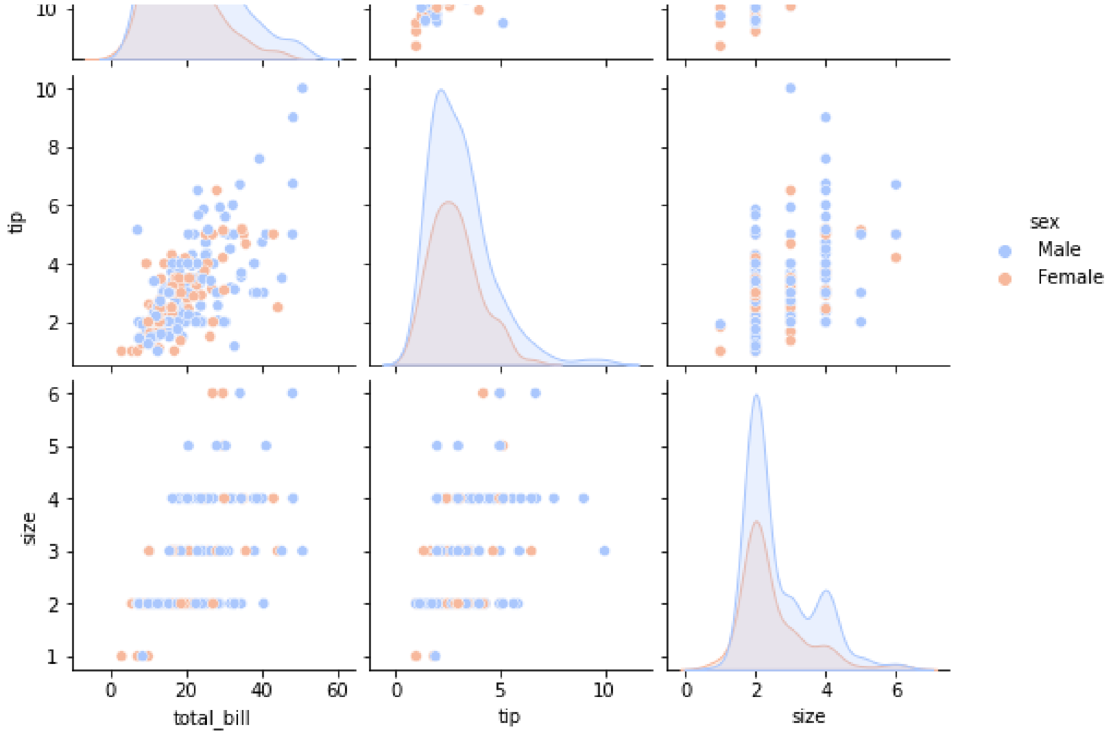
In [ ]:

```
s.pairplot(dataset,hue='sex',palette='coolwarm')
```

Out[ ]:

```
<seaborn.axisgrid.PairGrid at 0x7fa750e926d0>
```



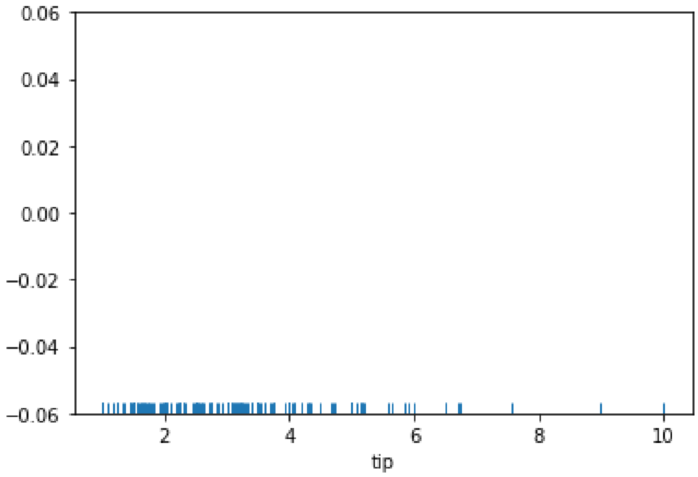


In [ ]:

```
s.rugplot(dataset['tip'])
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa75057d1d0>
```



In [ ]:

```

```

CATEGORICAL PLOTS

In [ ]:

```
dataset.head(6)
```

Out[ ]:

	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

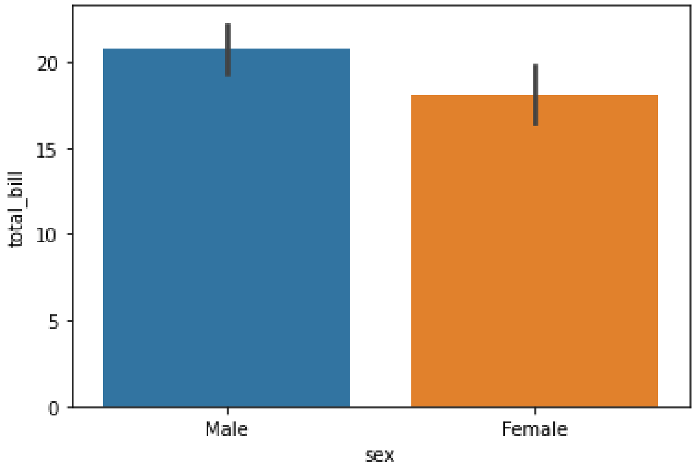
	total_bill	tip	sex	smoker	day	time	size
5	25.29	4.71	Male	No	Sun	Dinner	4

In [ ]:

```
s.barplot(x='sex',y='total_bill',data=dataset)
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa74ed5da90>
```

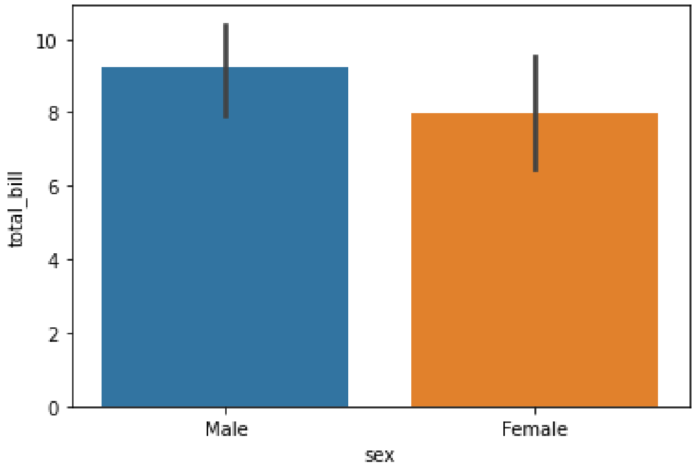


In [ ]:

```
import numpy as np
s.barplot(x='sex',y='total_bill',data=dataset,estimator=np.std)
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa74ecdd5d0>
```

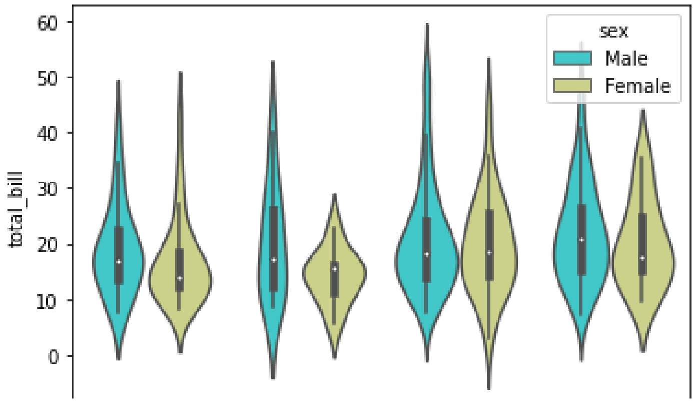


In [ ]:

```
s.violinplot(x='day',y='total_bill',data=dataset,palette='rainbow',hue='sex')
```

Out[ ]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fa74ed5ab50>
```



RESULT:Program executed sucessfully and output is obtained