

Entrée [7]:

```
import matplotlib.pyplot as plt
import numpy as np
from numpy.random import randint
```

Entrée [4]:

```
%matplotlib inline
```

Entrée [20]:

```
x = np.linspace(1, 10, 20)
x
```

Out[20]:

```
array([ 1.          ,  1.47368421,  1.94736842,  2.42105263,  2.89473684,
        3.36842105,  3.84210526,  4.31578947,  4.78947368,  5.26315789,
        5.73684211,  6.21052632,  6.68421053,  7.15789474,  7.63157895,
        8.10526316,  8.57894737,  9.05263158,  9.52631579, 10.          ])
```

Entrée [8]:

```
y = randint(1, 50, 20)
y
```

Out[8]:

```
array([18, 14, 17, 46, 11, 44, 48, 16, 49, 25, 28, 22, 18, 24,  2,  4, 43,
       37, 43, 38])
```

Entrée [9]:

```
y.size
```

Out[9]:

```
20
```

Entrée [11]:

```
dir(plt)
```

Out[11]:

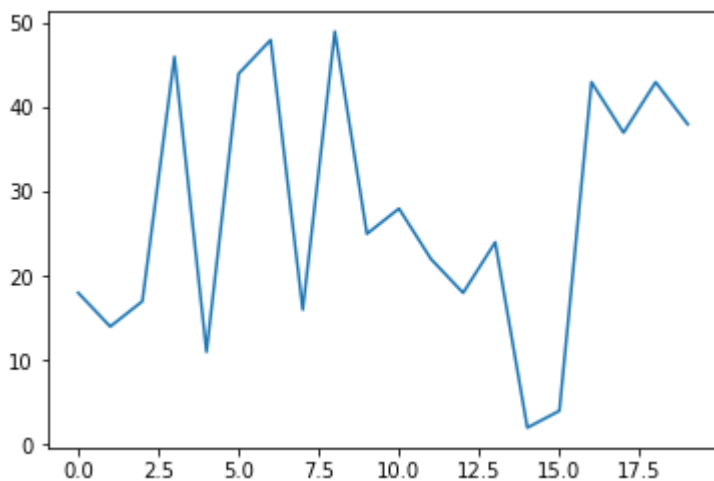
```
['Annotation',  
'Arrow',  
'Artist',  
'AutoLocator',  
'Axes',  
'Button',  
'Circle',  
'Figure',  
'FigureCanvasBase',  
'FixedFormatter',  
'FixedLocator',  
'FormatStrFormatter',  
'Formatter',  
'FuncFormatter',  
'GridSpec',  
'IndexLocator',  
'Line2D',  
'LinearLocator']
```

Entrée [12]:

```
plt.plot(y)
```

Out[12]:

```
[<matplotlib.lines.Line2D at 0x1975e952128>]
```



Entrée [16]:

```
print(np.sort(y))
```

```
[ 2  4 11 14 16 17 18 18 22 24 25 28 37 38 43 43 44 46 48 49]
```

Entrée [17]:

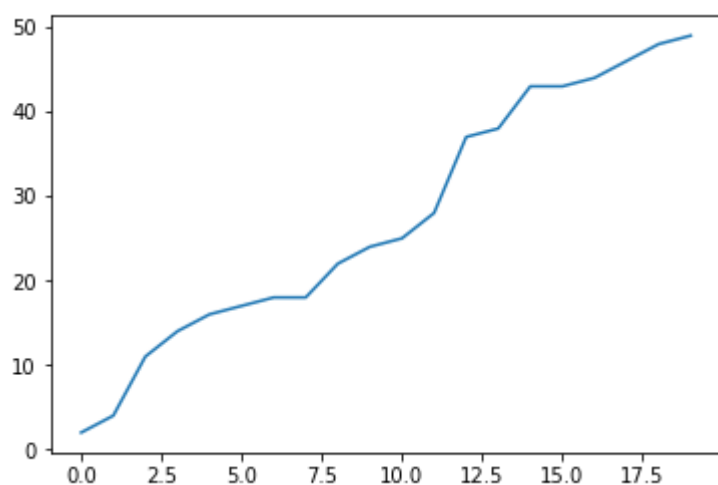
```
y = np.sort(y)
```

Entrée [18]:

```
plt.plot(y)
```

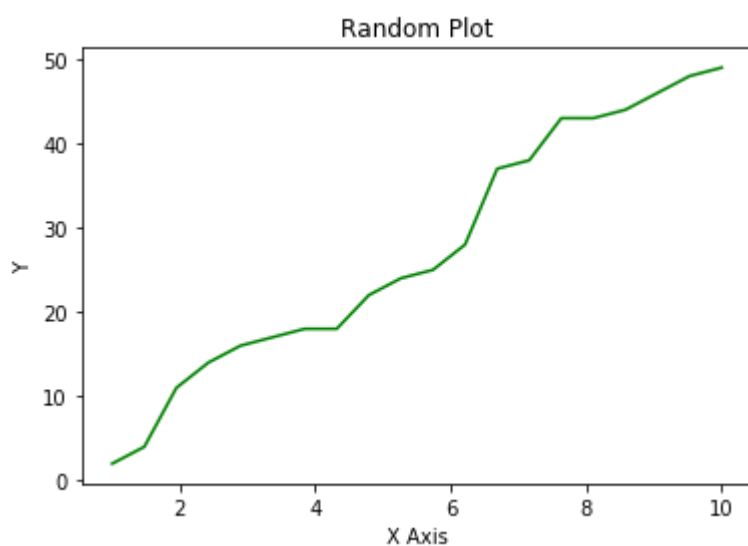
Out[18]:

[<matplotlib.lines.Line2D at 0x1975e9df2b0>]



Entrée [37]:

```
plt.plot(x, y, color = 'g')  
plt.xlabel('X Axis')  
plt.ylabel('Y')  
plt.title('Random Plot')  
plt.show()
```



Entrée [47]:

```
y2 = y*x
```

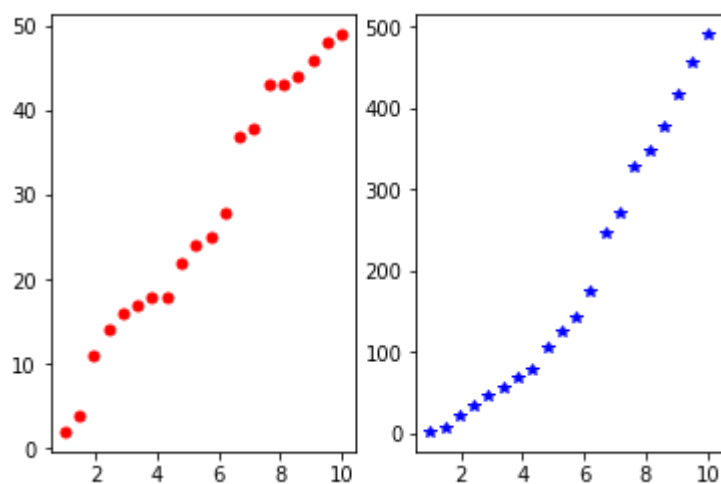
Entrée [55]:

```
plt.subplot(1, 2, 1)
plt.plot(x, y, 'ro', markersize = 5)

plt.subplot(1, 2, 2)
plt.plot(x, y2, 'b*')
```

Out[55]:

[<matplotlib.lines.Line2D at 0x197609e37f0>]



Entrée [ ]:

## matlab vs matplotlib

Entrée [56]:

```
#objet oriented method
```

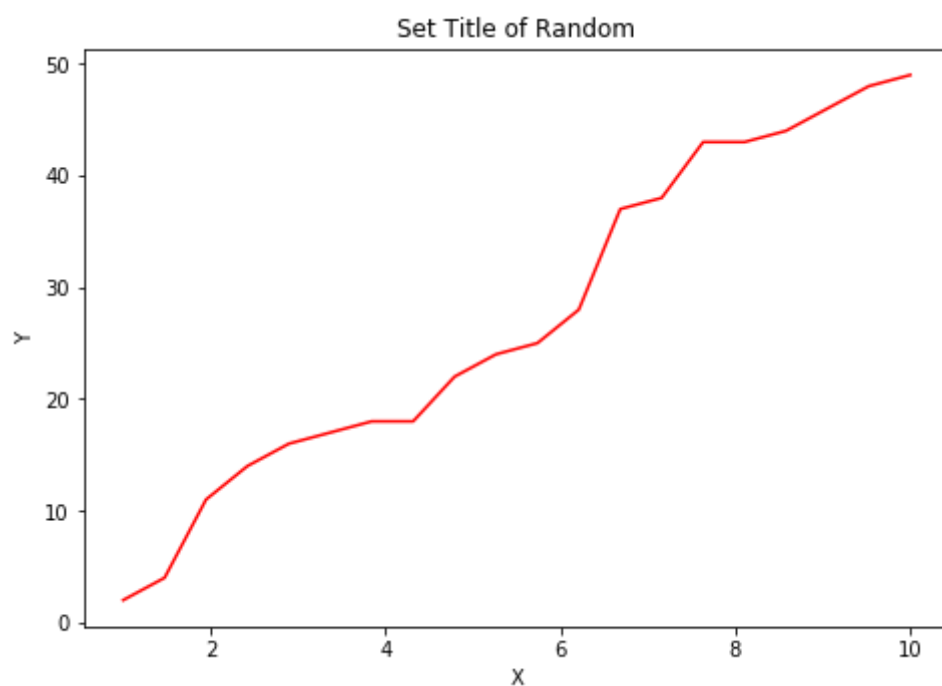
Entrée [63]:

```
fig = plt.figure()
axes = fig.add_axes([0.1, 0.1, 1, 1])

axes.plot(x, y, 'r')
axes.set_xlabel('X')
axes.set_ylabel('Y')
axes.set_title('Set Title of Random')
```

Out[63]:

Text(0.5, 1.0, 'Set Title of Random')



Entrée [64]:

```
dir(axes)
```

Out[64]:

```
[ '__class__',
  '__delattr__',
  '__dict__',
  '__dir__',
  '__doc__',
  '__eq__',
  '__format__',
  '__ge__',
  '__getattr__',
  '__getstate__',
  '__gt__',
  '__hash__',
  '__init__',
  '__init_subclass__',
  '__le__',
  '__lt__',
  '__module__',
  'ne' ]
```

Entrée [ ]:

Entrée [70]:

```

fig = plt.figure()
ax1 = fig.add_axes([0, 0, 1, 1])
ax2 = fig.add_axes([0.1, 0.6, 0.4, 0.3])

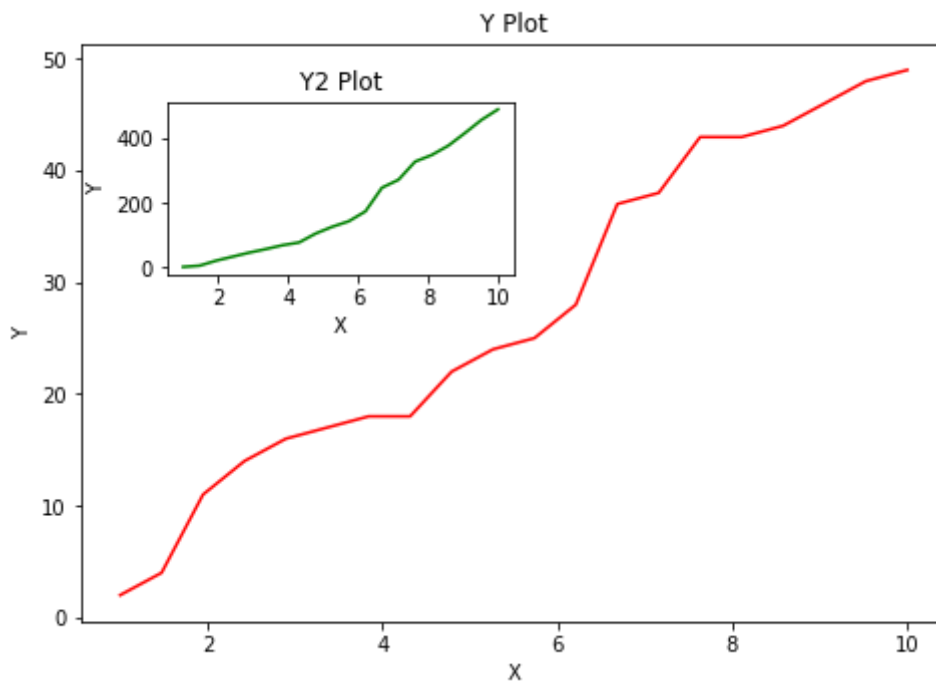
ax1.plot(x, y, 'r')
ax1.set_xlabel('X')
ax1.set_ylabel('Y')
ax1.set_title('Y Plot')

ax2.plot(x, y2, 'g')
ax2.set_xlabel('X')
ax2.set_ylabel('Y')
ax2.set_title('Y2 Plot')

```

Out[70]:

Text(0.5, 1.0, 'Y2 Plot')



Entrée [71]:

```

#plt.subplot()
#plt.subplots()

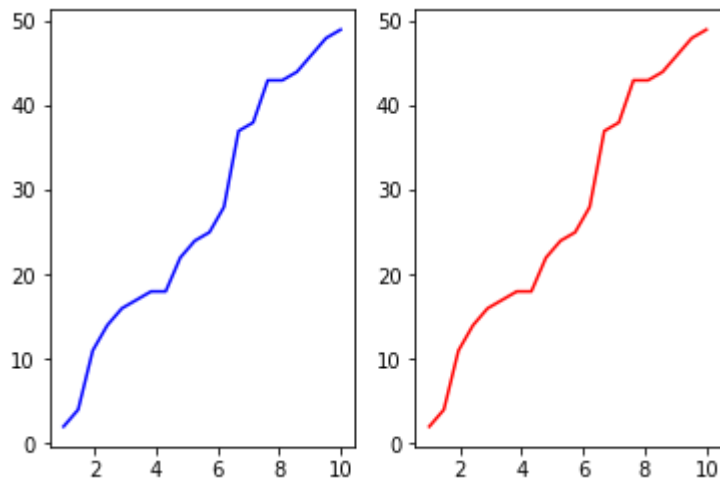
```

Entrée [79]:

```
fig, ax = plt.subplots(1,2)
ax[0].plot(x, y, 'b')
ax[1].plot(x, y, 'r')
```

Out[79]:

[<matplotlib.lines.Line2D at 0x197621555c0>]



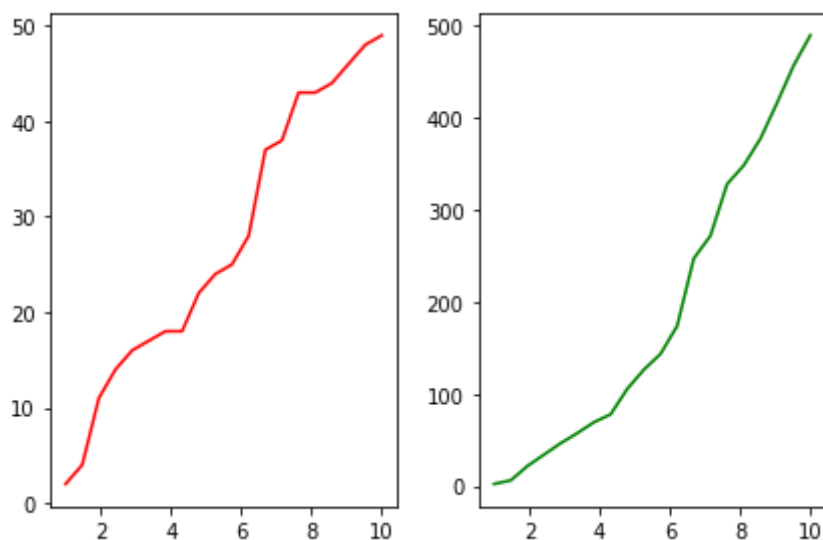


Entrée [87]:

```
fig, ax = plt.subplots(1, 2)
col = ['r', 'g']
data = [y, y2]

for i, axes in enumerate(ax):
    axes.plot(x, data[i], col[i])

fig.tight_layout()
```

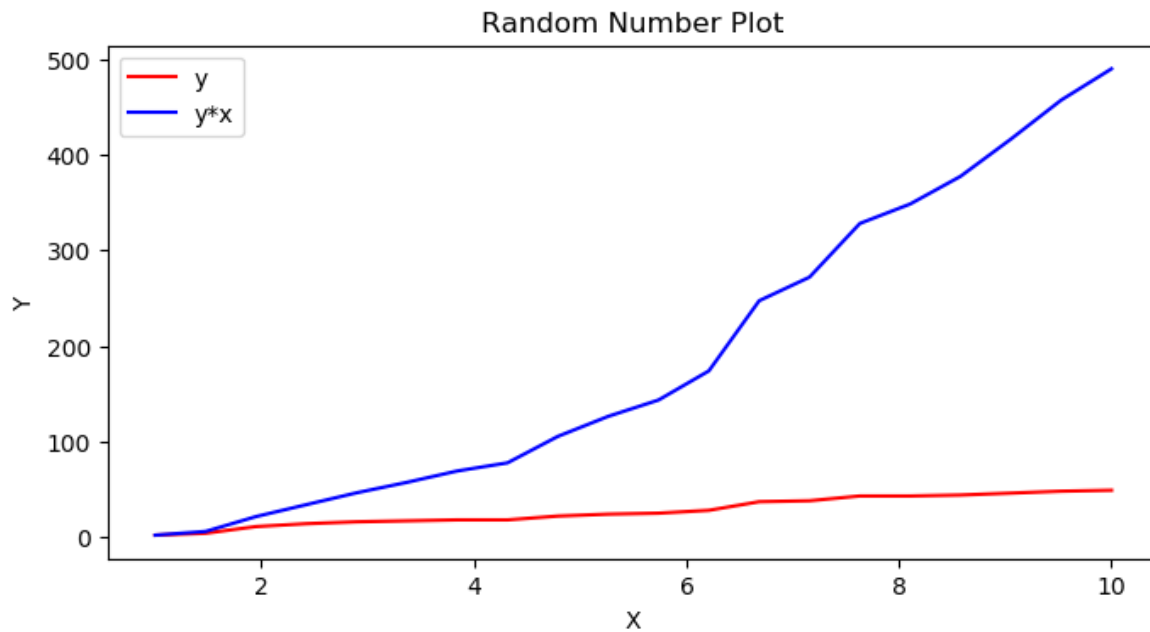


Entrée [ ]:

Entrée [110]:

```
fig, ax = plt.subplots(figsize = (8,4), dpi = 100)

ax.plot(x, y, 'r', label = 'y')
ax.plot(x, y2, 'b', label = 'y*x')
ax.set_xlabel('X')
ax.set_ylabel('Y')
ax.set_title('Random Number Plot')
ax.legend(loc = 0)
fig.savefig('random file.png', dpi = 100)
```



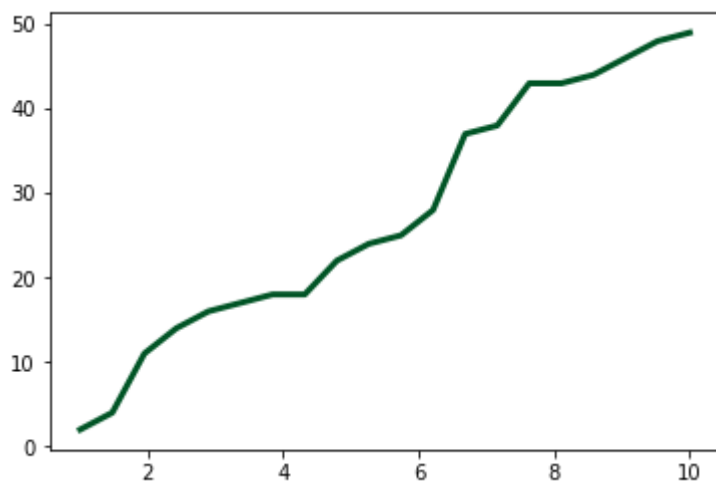
Entrée [ ]:

Entrée [125]:

```
fig, ax = plt.subplots()
ax.plot(x, y, markersize = 12, linewidth = 3, color = '#005425')
```

Out[125]:

[<matplotlib.lines.Line2D at 0x1976225b860>]



Entrée [ ]:

Entrée [136]:

```
fig, ax = plt.subplots(1, 3, figsize = (12, 4))

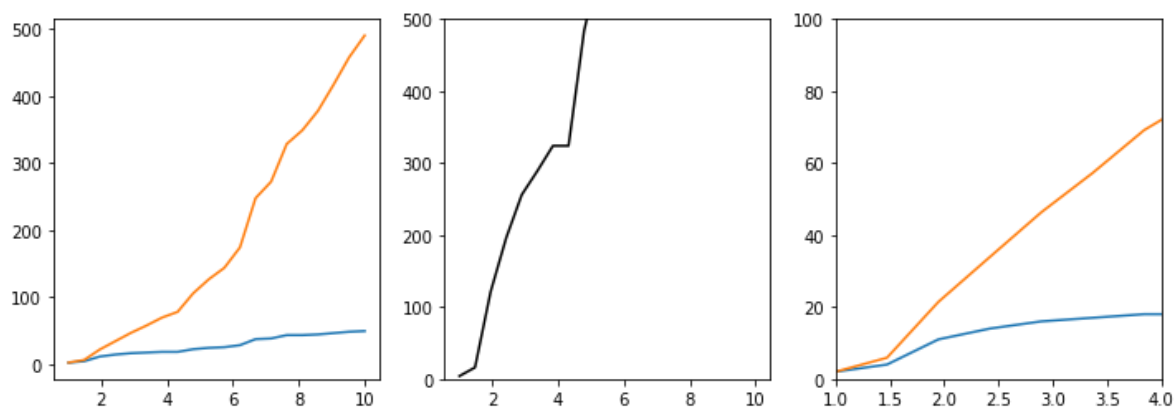
ax[0].plot(x, y, x, y2)

ax[1].plot(x, y**2, 'k')
ax[1].set_ylim([0, 500])

ax[2].plot(x, y, x, y2)
ax[2].set_ylim([0, 100])
ax[2].set_xlim([1, 4])
```

Out[136]:

(1, 4)



Entrée [135]:

```
dir(ax[0])
```

Out[135]:

```
['_class__',
 '__delattr__',
 '__dict__',
 '__dir__',
 '__doc__',
 '__eq__',
 '__format__',
 '__ge__',
 '__getattr__',
 '__getattribute__',
 '__getstate__',
 '__gt__',
 '__hash__',
 '__init__',
 '__init_subclass__',
 '__le__',
 '__lt__',
 '__module__',
 'ne ']
```

Entrée [ ]:

Entrée [ ]:

Entrée [137]:

```
dir(plt)
```

Out[137]:

```
['Annotation',  
 'Arrow',  
 'Artist',  
 'AutoLocator',  
 'Axes',  
 'Button',  
 'Circle',  
 'Figure',  
 'FigureCanvasBase',  
 'FixedFormatter',  
 'FixedLocator',  
 'FormatStrFormatter',  
 'Formatter',  
 'FuncFormatter',  
 'GridSpec',  
 'IndexLocator',  
 'Line2D',  
 'LinearLocator']
```

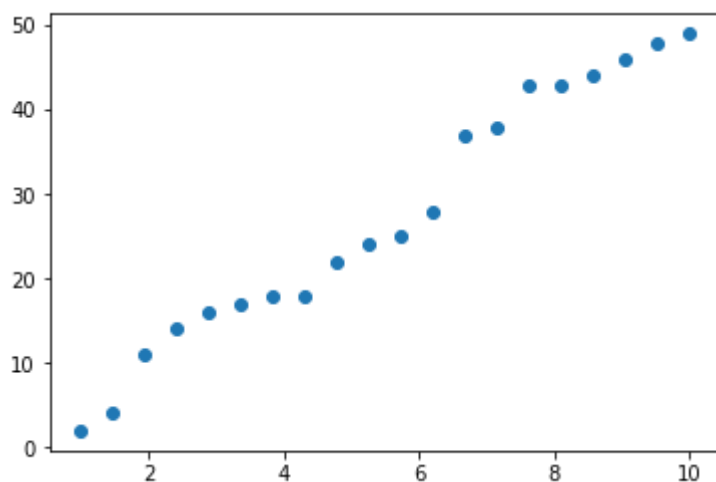
Entrée [ ]:

Entrée [138]:

```
plt.scatter(x, y)
```

Out[138]:

```
<matplotlib.collections.PathCollection at 0x1976301e550>
```



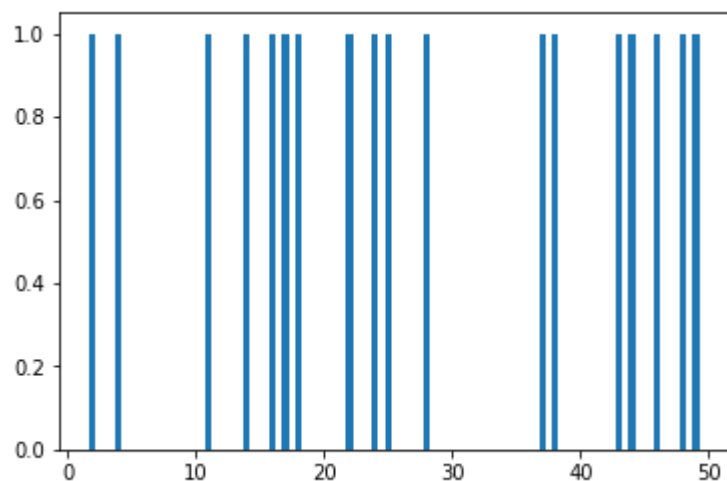
Entrée [ ]:

Entrée [143]:

```
plt.bar(y, height=1, width=0.5)
```

Out[143]:

<BarContainer object of 20 artists>



Entrée [ ]:

Entrée [144]:

```
from random import sample
```

Entrée [146]:

```
data = sample(range(1, 10000), 10)  
data
```

Out[146]:

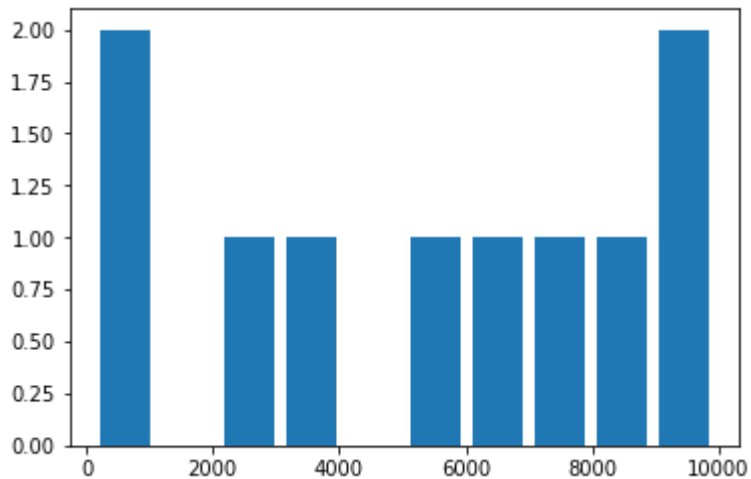
[981, 8668, 5340, 7486, 114, 9562, 6817, 2753, 9944, 3504]

Entrée [148]:

```
plt.hist(data, rwidth=0.8)
```

Out[148]:

```
(array([2., 0., 1., 1., 0., 1., 1., 1., 1., 2.]),  
 array([ 114., 1097., 2080., 3063., 4046., 5029., 6012., 6995., 7978.,  
        8961., 9944.]),  
 <a list of 10 Patch objects>)
```



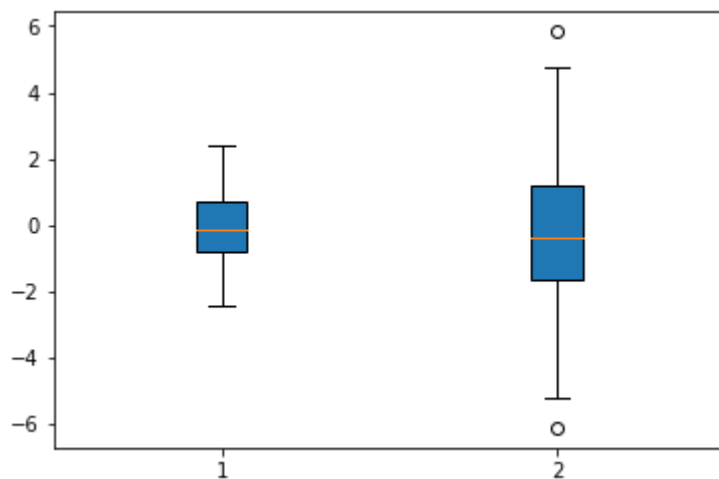
Entrée [ ]:

Entrée [155]:

```
data = [np.random.normal(0, std, 100) for std in range(1,3)]
```

Entrée [157]:

```
plt.boxplot(data, vert = True, patch_artist= True)
plt.show()
```

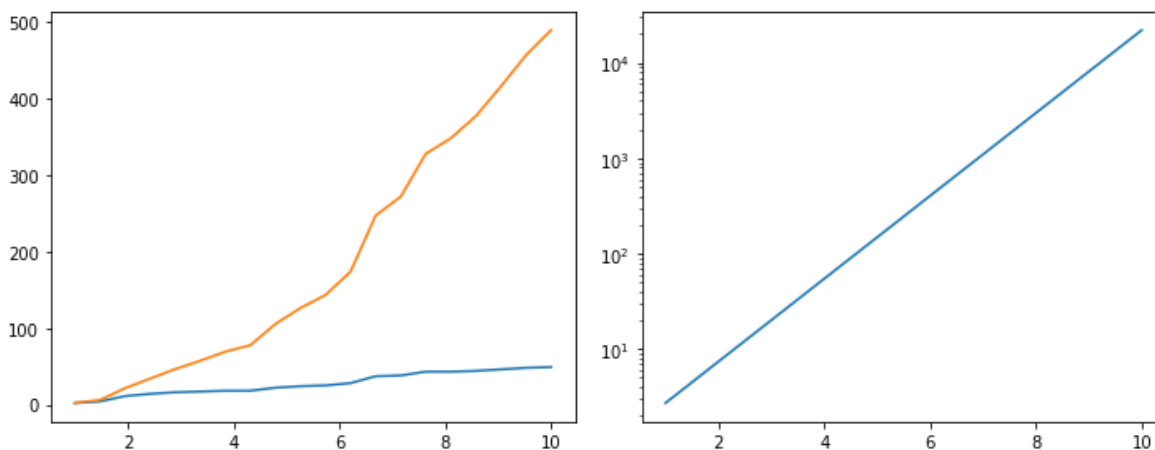


Entrée [ ]:

Entrée [164]:

```
fig, ax = plt.subplots(1, 2, figsize= (10, 4))
ax[0].plot(x, y, x, y2)

ax[1].plot(x, np.exp(x))
ax[1].set_yscale('log')
fig.tight_layout()
```



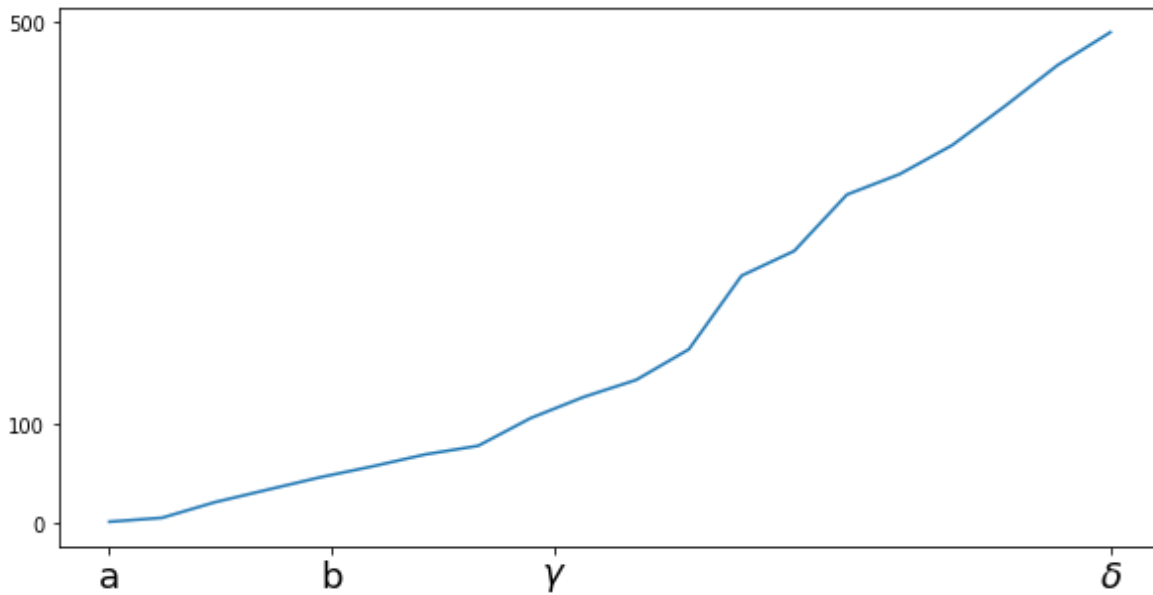
Entrée [ ]:

Entrée [181]:

```
fig, ax = plt.subplots(figsize = (10,5))
ax.plot(x, y2)
ax.set_xticks([1, 3, 5, 10])
ax.set_xticklabels([r'a', r'b', r'$\gamma$', r'$\delta$'], fontsize=18)
ax.set_yticks([0, 100, 500])
```

Out[181]:

```
[<matplotlib.axis.YTick at 0x197670f06a0>,
 <matplotlib.axis.YTick at 0x197670fff28>,
 <matplotlib.axis.YTick at 0x197670ec978>]
```



Entrée [185]:

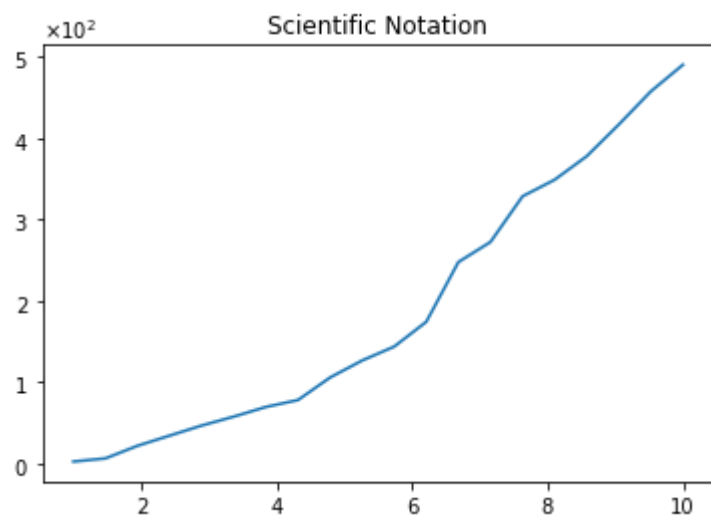
```
from matplotlib import ticker
```



Entrée [189]:

```
fig, ax = plt.subplots()
ax.plot(x, y2)
ax.set_title('Scientific Notation')

formatter = ticker.ScalarFormatter(useMathText=True)
formatter.set_scientific(True)
formatter.set_powerlimits((-1, 2))
ax.yaxis.set_major_formatter(formatter)
```



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