

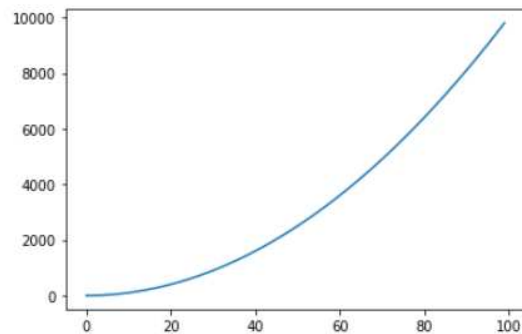
Matplotlib 모듈 2



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Matplotlib 모듈 사용 예

```
In [2]: import matplotlib.pyplot as plt  
  
X = range(100)  
Y = [value ** 2 for value in X]  
  
plt.plot(X, Y)  
plt.show()
```

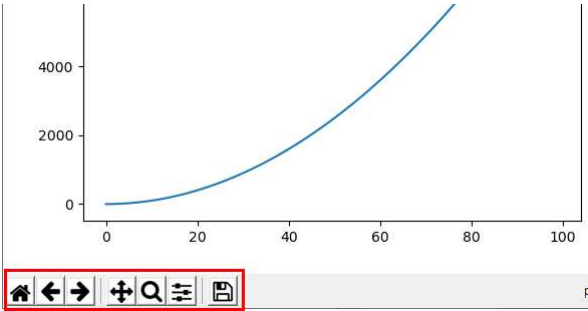


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Matplotlib 모듈 사용 예

➤ Python IDLE에서 실행시켰을 때

- 집 : 처음 상태
- <- : 이전 보기
- -> : 다음 보기
- + : 그래프 이동/화대축소
- 0 :
- 디스크 : 파일 저장



Matplotlib 모듈 사용 예

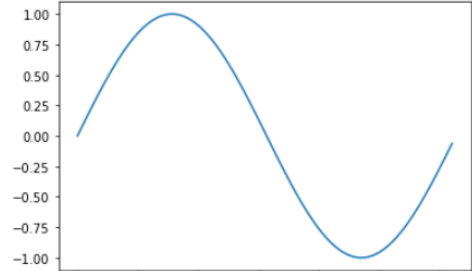
```
In [8]: import math
import matplotlib.pyplot as plt


T = range(100)
X = [(2 * math.pi * t) / len(T) for t in T]
Y = [math.sin(value) for value in X]

print(type(X), type(Y))

plt.plot(X, Y)
plt.show()

<class 'list'> <class 'list'>
```




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Matplotlib 모듈 사용 예

넘파이의 한번에 전체 배열에서 연산을 수행하며, 곡선 좌표를 생성할 많은 작업을 줄여줌

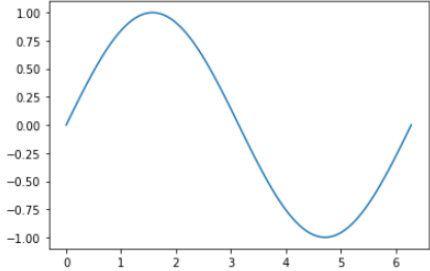
```
In [9]: import numpy as np
import matplotlib.pyplot as plt

X = np.linspace(0, 2 * np.pi, 100)
Y = np.sin(X)

print(type(X), type(Y))

plt.plot(X, Y)
plt.show()
```

<class 'numpy.ndarray'> <class 'numpy.ndarray'>



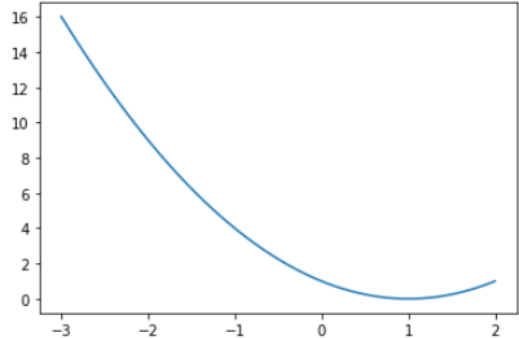
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Matplotlib 모듈 사용 예

```
In [4]: import numpy as np
import matplotlib.pyplot as plt

X = np.linspace(-3, 2, 200)
Y = X ** 2 - 2 * X + 1

plt.plot(X, Y)
plt.show()
```



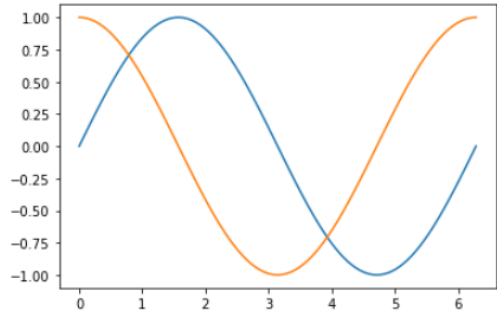
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Matplotlib 모듈 사용 예

```
In [10]: import numpy as np
import matplotlib.pyplot as plt

X = np.linspace(0, 2 * np.pi, 100)
Ya = np.sin(X)
Yb = np.cos(X)

plt.plot(X, Ya)
plt.plot(X, Yb)
plt.show()
```



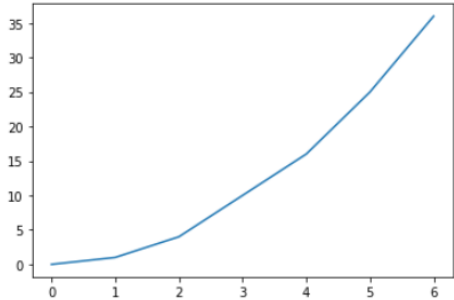
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Matplotlib 모듈 사용 예

```
In [16]: import numpy as np
import matplotlib.pyplot as plt

X, Y = [], []
for line in open('my_data.txt', 'r'):
    values = [float(s) for s in line.split()]
    X.append(values[0])
    Y.append(values[1])

plt.plot(X, Y)
plt.show()
```



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Matplotlib 모듈 사용 예

내장 함수 zip() 은 동일한 개수로 이루어진 자료형을 묶어 주는 역할

```
In [21]: no = [1,2,3,4]
name = ['hong','gil','dong','nim']

no_name_tuple = list(zip(no,name))
print(no_name_tuple)
no_name_dic = dict(zip(no,name))
print(no_name_dic)

[(1, 'hong'), (2, 'gil'), (3, 'dong'), (4, 'nim')]
{1: 'hong', 2: 'gil', 3: 'dong', 4: 'nim'}
```

```
In [35]: no = '1234'
name = 'ABCD'

no_name_tuple = list(zip(no,name))
print(no_name_tuple)
no_name_dic = dict(zip(no,name))
print(no_name_dic)

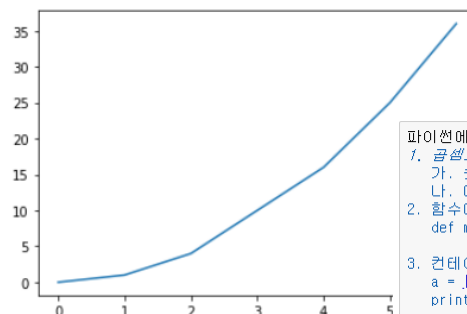
[(1, 'A'), (2, 'B'), (3, 'C'), (4, 'D')]
{1: 'A', 2: 'B', 3: 'C', 4: 'D'}
```

Matplotlib 모듈 사용 예

```
In [31]: import numpy as np
import matplotlib.pyplot as plt

with open('my_data.txt', 'r') as f:
    #print([float(s) for s in line.split()] for line in f)
    #print(*[float(s) for s in line.split()] for line in f)
    X, Y = zip(*[float(s) for s in line.split()] for line in f)

plt.plot(X, Y)
plt.show()
```



파이썬에서 *의 역할

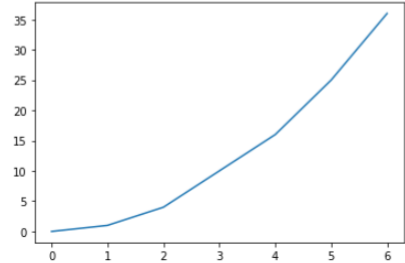
1. 곱셈으로 사용 (숫자 곱, 데이터 반복)
 가. 숫자 곱 : $a = 2 + 3 \rightarrow 6$
 나. 데이터 반복 : $a = 'ABC' + 3 \rightarrow 'ABCABCABC'$
2. 함수에서 위치인자와 키워드인자를 모듈 때 사용
 $def\ myfunc(*args, **kwargs):$
3. 컨테이너 데이터를 Unpack
 $a = [(1,2), (3,4), (5,6)]$
 $print(*a) \rightarrow [1,2], [3,4], [5,6]$

Matplotlib 모듈 사용 예

```
In [40]: import numpy as np
import matplotlib.pyplot as plt

data = np.loadtxt('my_data.txt')
print(data) # 6행 2열
print(data[:, 0]) # 모든행, 0번째 열
plt.plot(data[:,0], data[:,1])
plt.show()
```

```
[[ 0.  0.]
 [ 1.  1.]
 [ 2.  4.]
 [ 4. 16.]
 [ 5. 25.]
 [ 6. 36.]]
[0. 1. 2. 4. 5. 6.]
```



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Matplotlib 모듈 사용 예

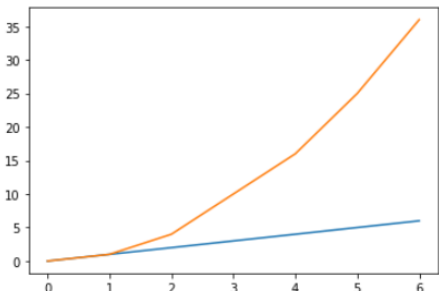
```
In [43]: import numpy as np
import matplotlib.pyplot as plt

data = np.loadtxt('my_data.txt')

for column in data.T:
    print(column)
    plt.plot(data[:,0], column)
plt.show()
```

```
[0. 1. 2. 4. 5. 6.]
[ 0.  1.  4. 16. 25. 36.]
```

```
my_data.txt - Windows 메모장
파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)
0 0
1 1
2 4
4 16
5 25
6 36
```

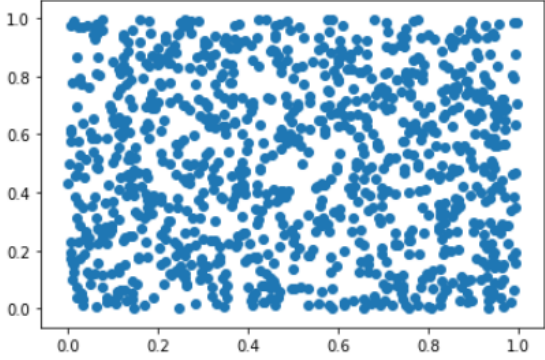


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Matplotlib 모듈 사용 예

```
In [2]: import numpy as np
import matplotlib.pyplot as plt

data = np.random.rand(1024, 2)
plt.scatter(data[:,0], data[:,1])
plt.show()
```



The scatter plot displays a uniform distribution of blue circular markers within a square frame. The x-axis and y-axis both range from 0.0 to 1.0, with major tick marks every 0.2 units. The points are scattered across the entire area, representing random data.

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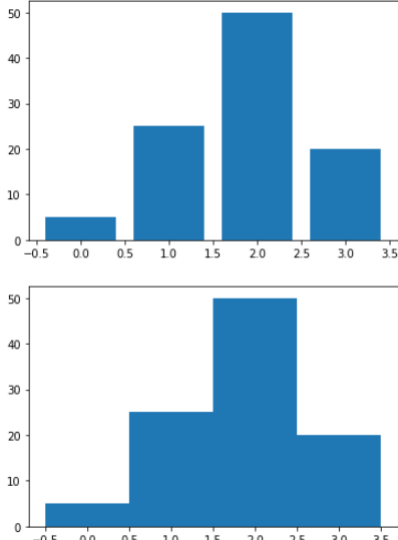
Matplotlib 모듈 사용 예

```
In [5]: import matplotlib.pyplot as plt

data=[5,25,50,20]

plt.bar(range(len(data)), data)
plt.show()

plt.bar(range(len(data)), data, width=1)
plt.show()
```



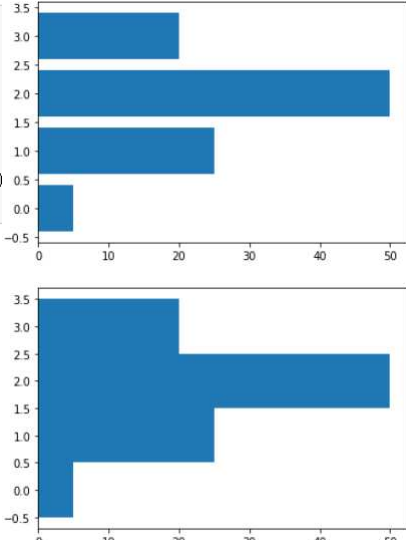
The top chart shows four bars with heights 5, 25, 50, and 20. The x-axis labels are -0.5, 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5. The y-axis ranges from 0 to 50. The bars are centered at x=0.5, 1.5, 2.5, and 3.5.

The bottom chart shows the same data with a width of 1. The bars are wider and overlap slightly. The x-axis labels are -0.5, 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5. The y-axis ranges from 0 to 50. The bars are centered at x=0.5, 1.5, 2.5, and 3.5.

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Matplotlib 모듈 사용 예

```
In [7]: import matplotlib.pyplot as plt
data=[5,25,50,20]
plt.barh(range(len(data)), data)
plt.show()
plt.barh(range(len(data)), data, height=1)
plt.show()
```

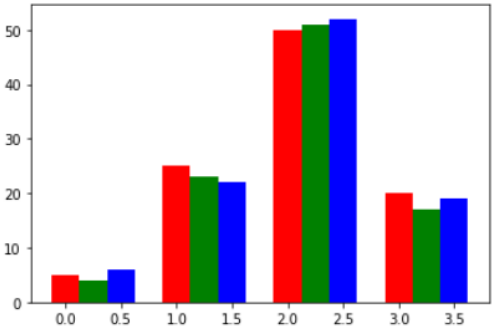


The top chart displays four horizontal blue bars. The x-axis ranges from 0 to 50, and the y-axis ranges from -0.5 to 3.5. The bars have heights of 5, 25, 50, and 20 respectively. The bottom chart displays the same data with a fixed height of 1 for each bar. The x-axis ranges from 0 to 50, and the y-axis ranges from -0.5 to 3.5. The bars have heights of 5, 25, 50, and 20 respectively.

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Matplotlib 모듈 사용 예

```
In [9]: import matplotlib.pyplot as plt
data=[[5,25,50,20],[4,23,51,17],[6,22,52,19]]
X = np.arange(4)
plt.bar(X + 0.00, data[0], color='r', width=0.25)
plt.bar(X + 0.25, data[1], color='g', width=0.25)
plt.bar(X + 0.50, data[2], color='b', width=0.25)
plt.show()
```



The chart displays three groups of bars. The x-axis ranges from 0.0 to 3.5, and the y-axis ranges from 0 to 50. The first group (X=0.00) has bars of height 5 (red), 25 (green), and 20 (blue). The second group (X=0.25) has bars of height 4 (red), 23 (green), and 51 (blue). The third group (X=0.50) has bars of height 6 (red), 22 (green), and 52 (blue).

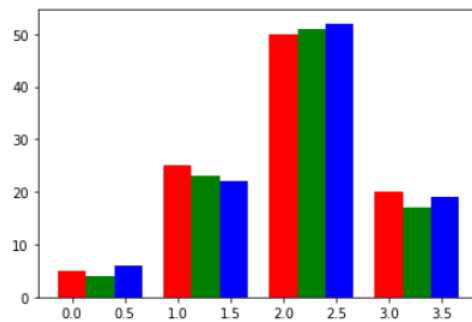
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Matplotlib 모듈 사용 예

```
In [10]: import matplotlib.pyplot as plt

data=[[5,25,50,20],[4,23,51,17],[6,22,52,19]]
color_list = ['r','g','b']
gap = 0.8 / len(data)

for i, row in enumerate(data):
    X = np.arange(len(row))
    plt.bar(X + i * gap, data[i], color=color_list[i], width=gap)
plt.show()
```



Matplotlib 모듈 사용 예

```
In [22]: import matplotlib.pyplot as plt

A=[5,25,50,20]
B=[4,23,51,17]
C=[6,22,52,19]

X = np.arange(4)
plt.bar(X, A, color='r', width=0.8)
plt.bar(X, B, color='g', bottom=A, width=0.5)
plt.bar(X, C, color='b', bottom=A+B, width=0.25)
plt.show()
```

```
ValueError                                Traceback (most r
<ipython-input-22-9b0f0363b2fb> in <module>
      8 plt.bar(X, A, color='r', width=0.8)
      9 plt.bar(X, B, color='g', bottom=A, width=0.5)
----> 10 plt.bar(X, C, color='b', bottom=A+B, width=0.25)
      11 plt.show()
```

Matplotlib 모듈 사용 예

```
In [23]: import numpy as np
import matplotlib.pyplot as plt

A=np.array([5,25,50,20])
B=np.array([4,23,51,17])
C=np.array([6,22,52,19])

X = np.arange(4)
plt.bar(X, A, color='r', width=0.8)
plt.bar(X, B, color='g', bottom=A, width=0.5)
plt.bar(X, C, color='b', bottom=A+B, width=0.25)
plt.show()
```

X	A	B	C
0	5	4	6
1	25	23	22
2	50	51	52
3	20	17	19

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Matplotlib 모듈 사용 예

```
In [26]: import numpy as np
import matplotlib.pyplot as plt

data=np.array([[5,25,50,20], [4,23,51,17], [6,22,52,19]])
color_list = ['r','g','b']

X = np.arange(data.shape[1])

for i in range(data.shape[0]):
    plt.bar(X, data[i], color=color_list[i], bottom=np.sum(data[:i], axis=0))
plt.show()
```

X	A	B	C
0	5	4	6
1	25	23	22
2	50	51	52
3	20	17	19

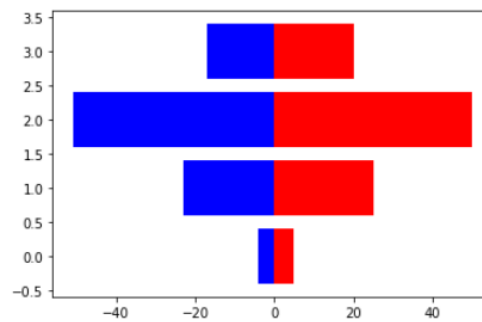
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Matplotlib 모듈 사용 예

```
In [30]: import numpy as np
import matplotlib.pyplot as plt

women_pop = np.array([5, 25, 50, 20])
man_pop   = np.array([4, 23, 51, 17])

X = np.arange(4)
plt.barh(X, women_pop, color='r')
plt.barh(X, -man_pop, color='b')
plt.show()
```



Matplotlib 모듈 사용 예

```
In [31]: import matplotlib.pyplot as plt

data = np.array([5, 25, 50, 20])

plt.pie(data)
plt.show()
```

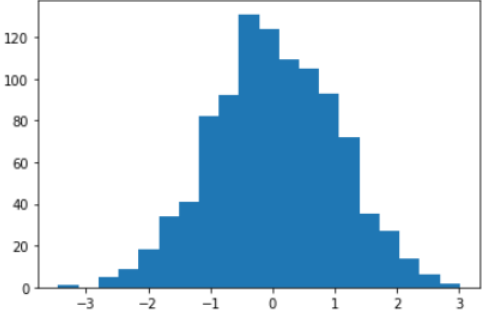


Matplotlib 모듈 사용 예

히스토그램 그리기

```
In [35]: import numpy as np
import matplotlib.pyplot as plt

X = np.random.randn(1000)
plt.hist(X, bins=20)
plt.show()
```



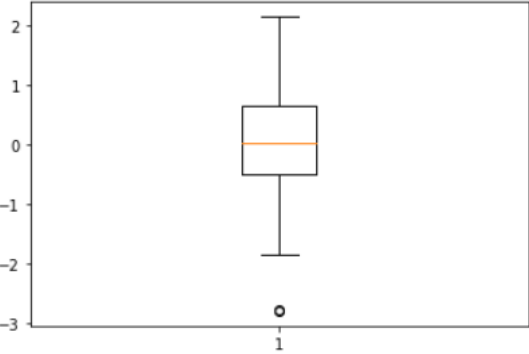
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Matplotlib 모듈 사용 예

```
In [40]: import numpy as np
import matplotlib.pyplot as plt

X = np.random.randn(100)

plt.boxplot(X)
plt.show()
```



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Matplotlib 모듈 사용 예

```
In [46]: import numpy as np
import matplotlib.pyplot as plt

X = np.random.randn(100, 5)

plt.boxplot(X)
plt.show()
```

