Plotting with Pyplot-II
Histograms, Frequency Distribution, Boxplots

As per CBSE curriculum
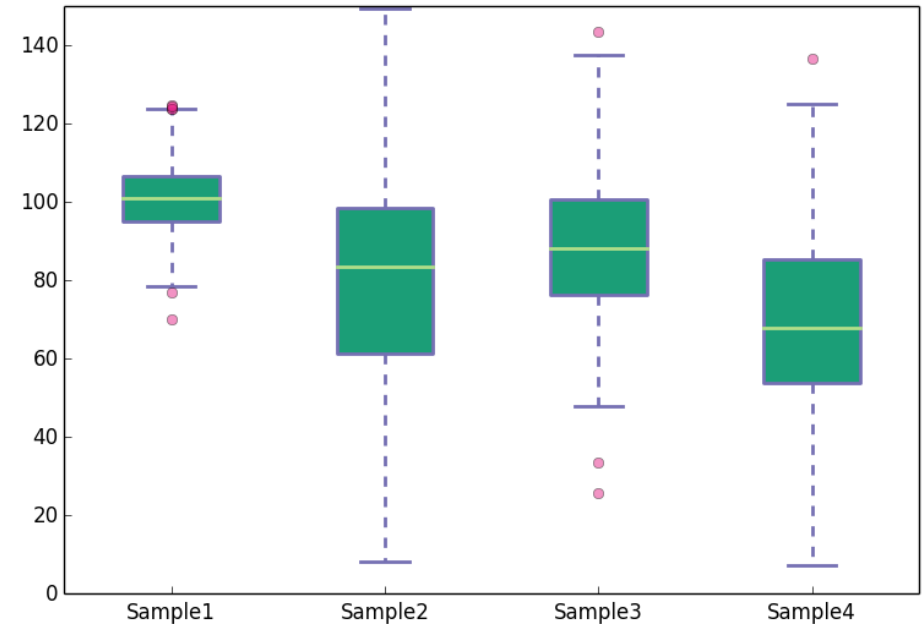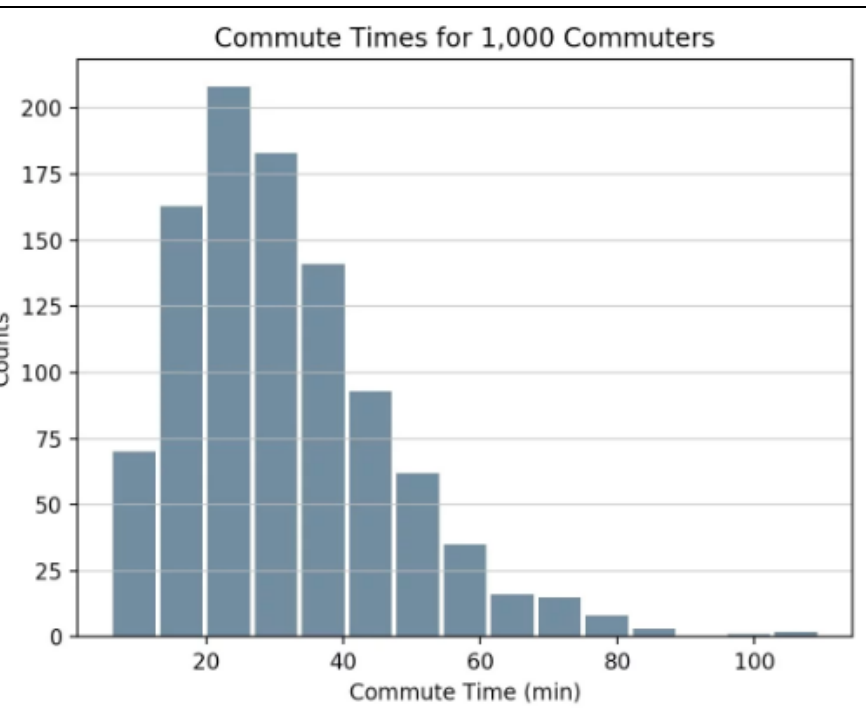Class 12

Chapter- 04

By-
Neha Tyagi
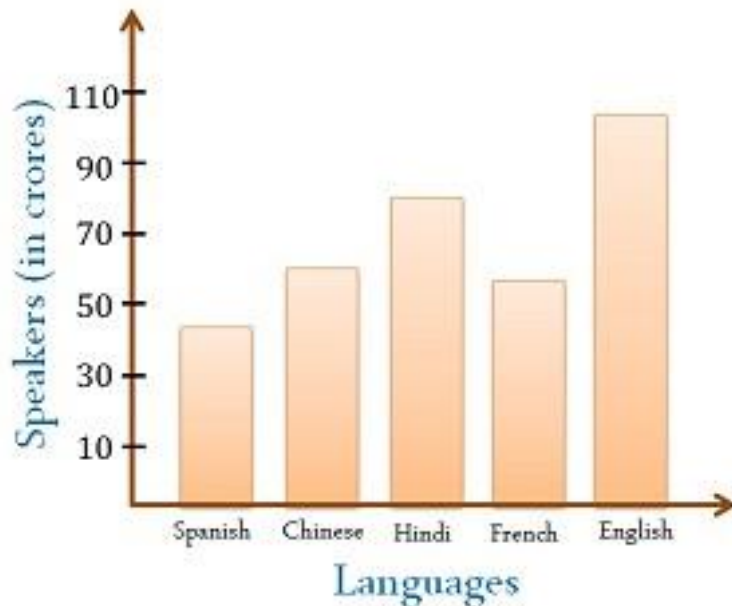**PGT (CS)**
KV 5 Jaipur(II Shift)
Jaipur Region

Introduction

- In last chapter, we learnt creation of line graph, bar graph, pie chart and scatter graph by pyplot.

- In this chapter, we will learn about histograms, frequency distribution and polygons.
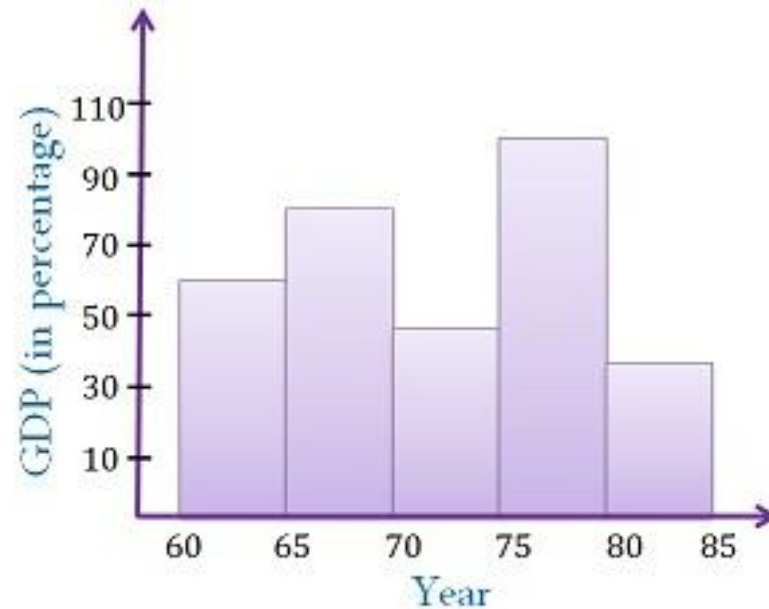
Creation of Histogram via Pyplot

- A histogram is a summarization tool for discrete or continuous data.

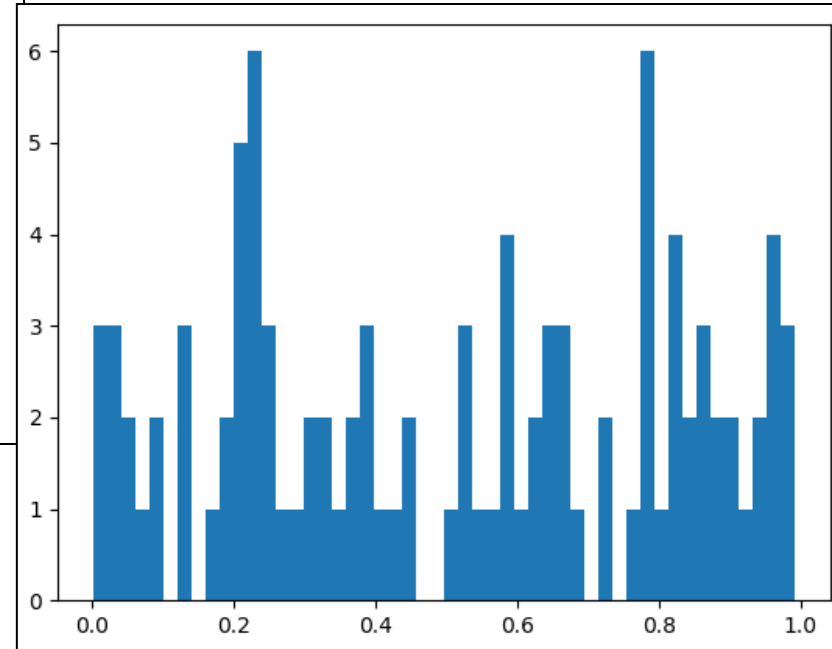- It shows no gab between the bars.

Bar Graph

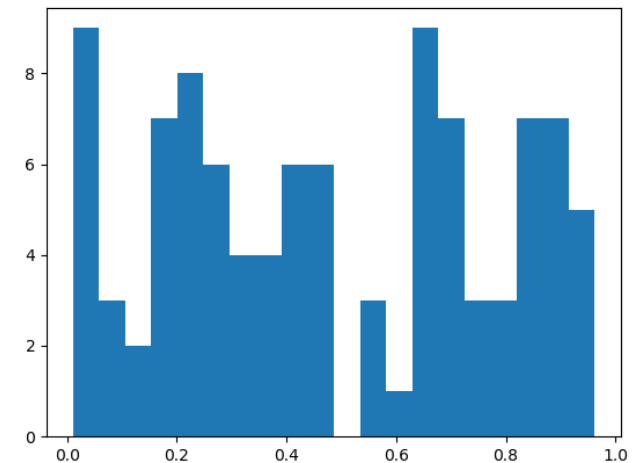**Histogram**

Creation of Histogram by hist () function

- Syntax→

  matplotlib.pyplot.hist(*x, bins=None, cumulative=False, hist type='bar', align='mid', orientation='vertical'*)

- X→ array or sequence

- bins→ takes an integer. This calculates edges.

- Cumulative→ default is false

- Histtype→ {'bar','barstacked','step','stepfilled'}

- For more information, go to the link-

https://matplotlib.org/3.1.0/api/_as_gen/matplotlib.pyplot.hist.html

Creation of Histogram by hist () function

```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())
plt.hist(x,bins=50)
plt.show()
```



```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())
plt.hist(x,bins=20)
plt.show()
```
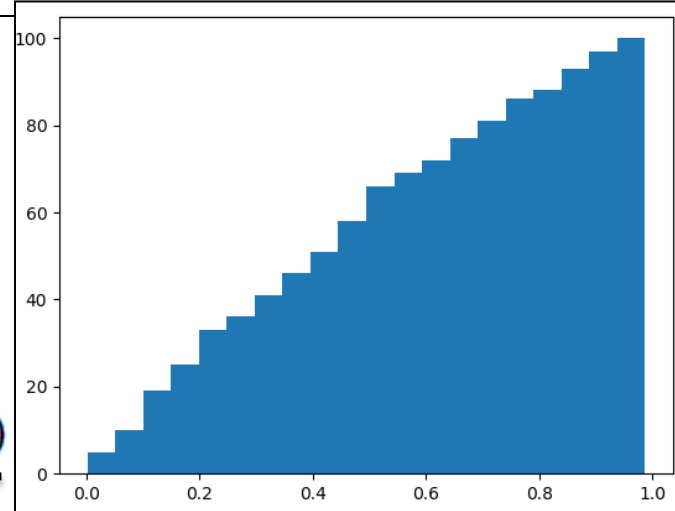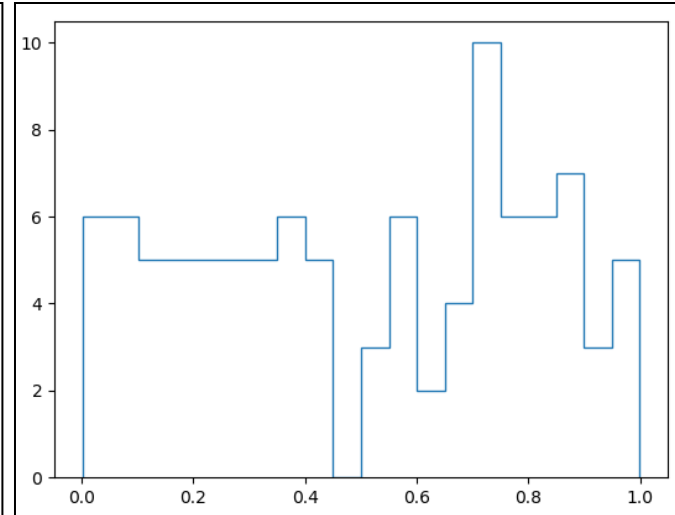
Creation of Histogram by hist () function


```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())
plt.hist(x,bins=20, cumulative=True)
plt.show()
```
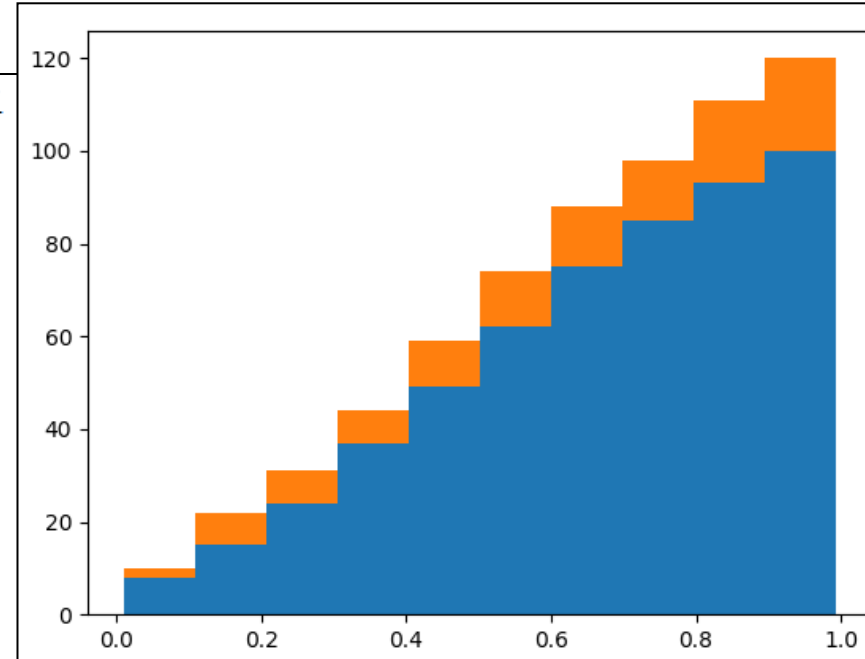


```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())
plt.hist(x,bins=20, histtype='step')
plt.show()
```
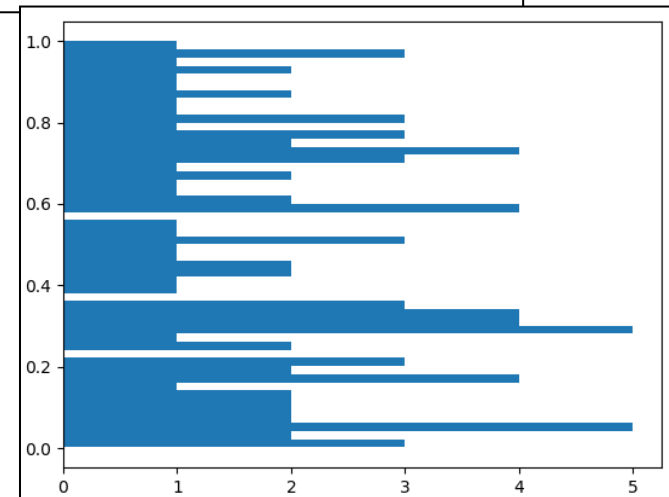
Bringing two arrays together in a histogram

```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())
y=[]
for i in range(0,100,5):
    y.append(random.random())
plt.hist([x,y],histtype='barstacked',cumulative=True)
plt.show()
```
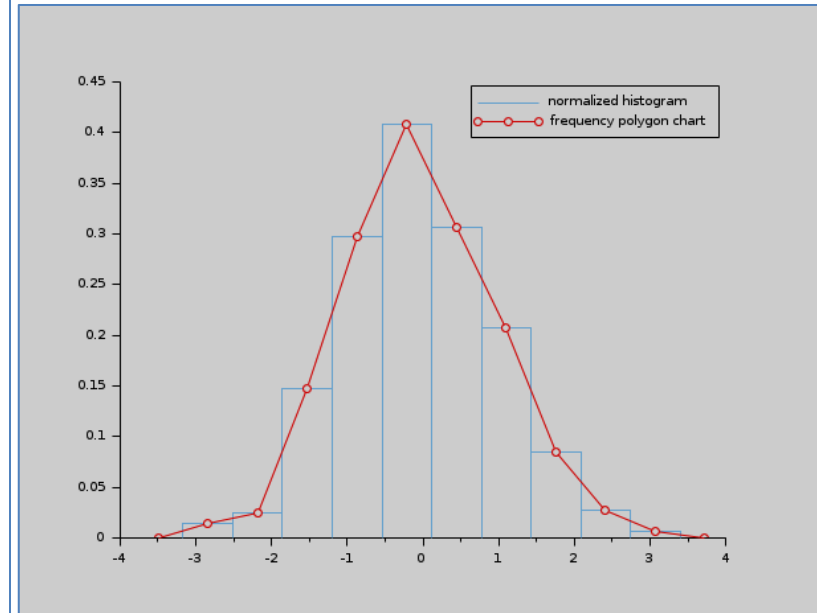


```python
import matplotlib.pyplot as plt
import numpy as np
import random
x=[]
for i in range(0,100):
    x.append(random.random())

plt.hist(x,bins=50,orientation='horizontal')
plt.show()
```
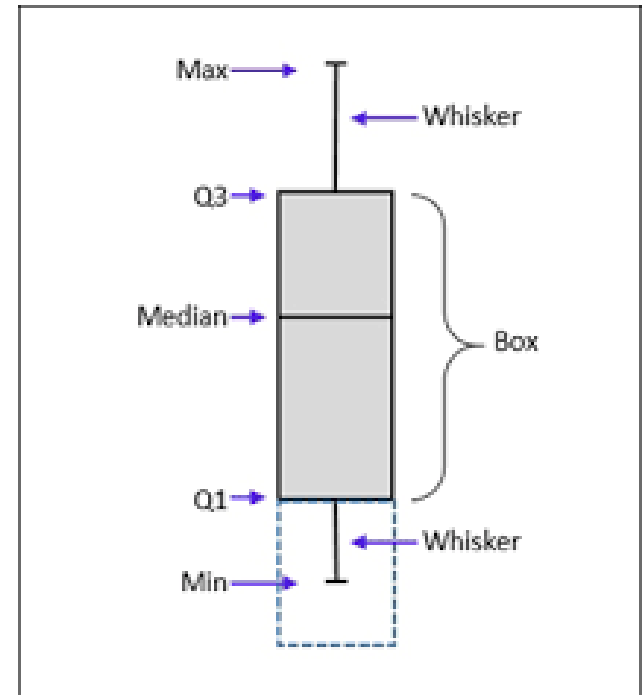
Creation of Frequency Polygons from Pyplot

- A frequency polygon is a frequency distribution graph.

- In a frequency polygon,the number of observations is marked with a single point at the midpoint of an interval. A straight line then connects each set of points.

- Pyplot doesn't provide any function frequency polygon. For this, you have to follow following steps-

  - Plot a histogram from the data.

  - Mark a single point at the midpoint of an interval/bin.

  - Draw straight lines to connect the adjacent points.

  - Connect first data point to the midpoint of previous interval on x-axis.

  - Connect last data point to the midpoint of following interval on x-axis.

- And you will have frequency polygon on your histogram.

Creating Boxplot

- Boxplot has become the standard technique for presenting the 5-number summary which consists of-
  - Minimum range value
  - Maximum range value
  - Upper quartile
  - Lower quartiles
  - median

- A Boxplot is used to show the
  range and middle half of ranked
  data. Ranked data is numerical data such as
  numbers etc.

Creating Boxplot

- Syntax →

Matplotlib.pyplot.boxplot (x, notch=None, vert=None,

               meanline = None, showmeans = none

               showbox=None)

X→   array or sequence

Notch→   if True, will produce a notched box plot.

Vert→   if true, makes plot vertical.

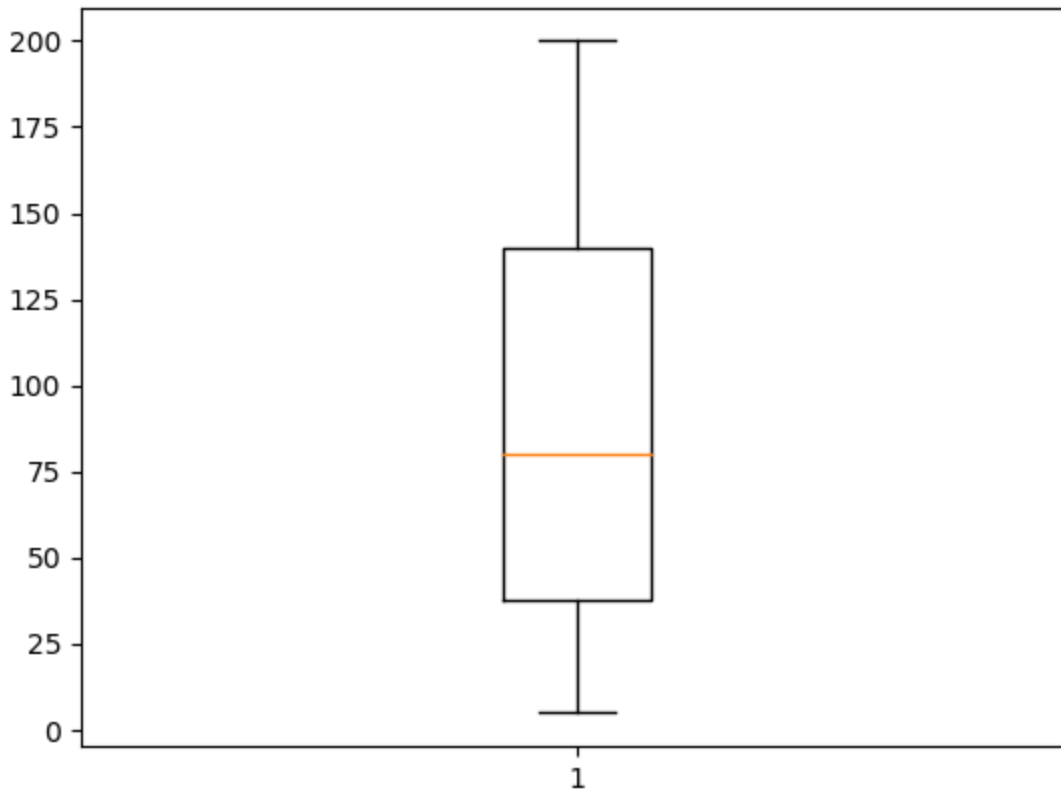Meanline→if true, will try to render the mean as a line.

Showbox→if true, show the central box.
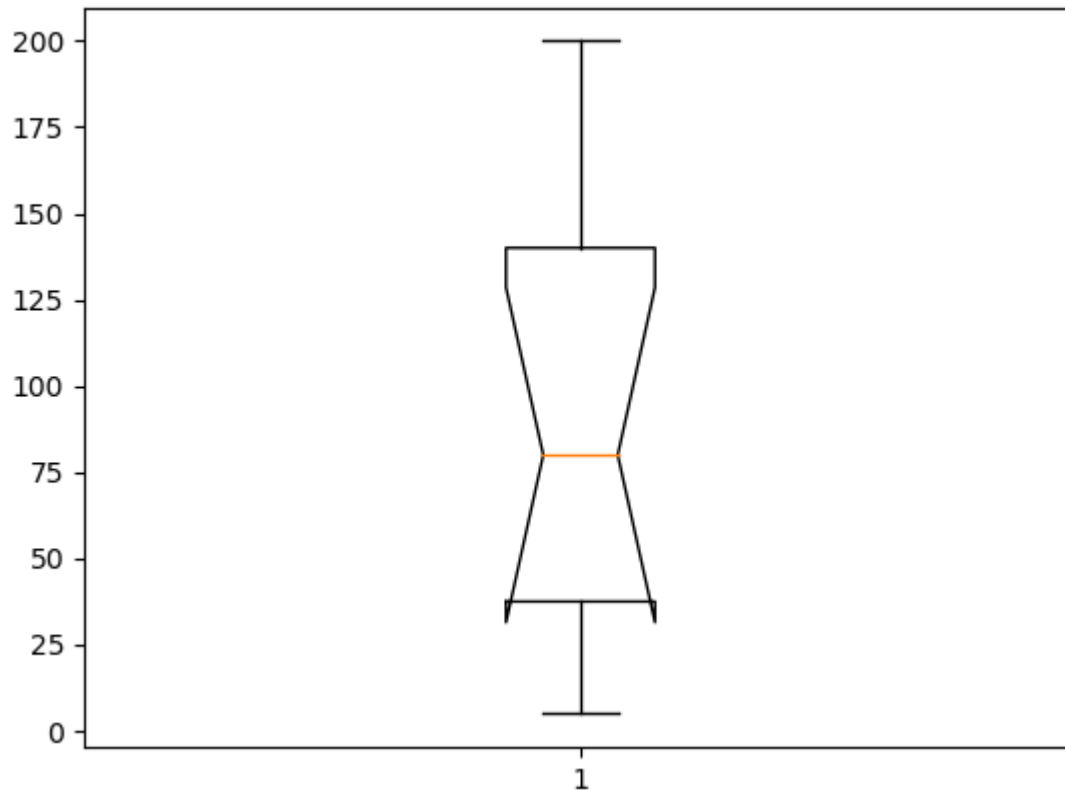
Showmean→ if true, show the arithmatic mean.

Creating Boxplot

```python
import matplotlib.pyplot as plt
ary=[5,20,30,45,60,80,100,140,150,200,140]
plt.boxplot(ary)
plt.show()
```
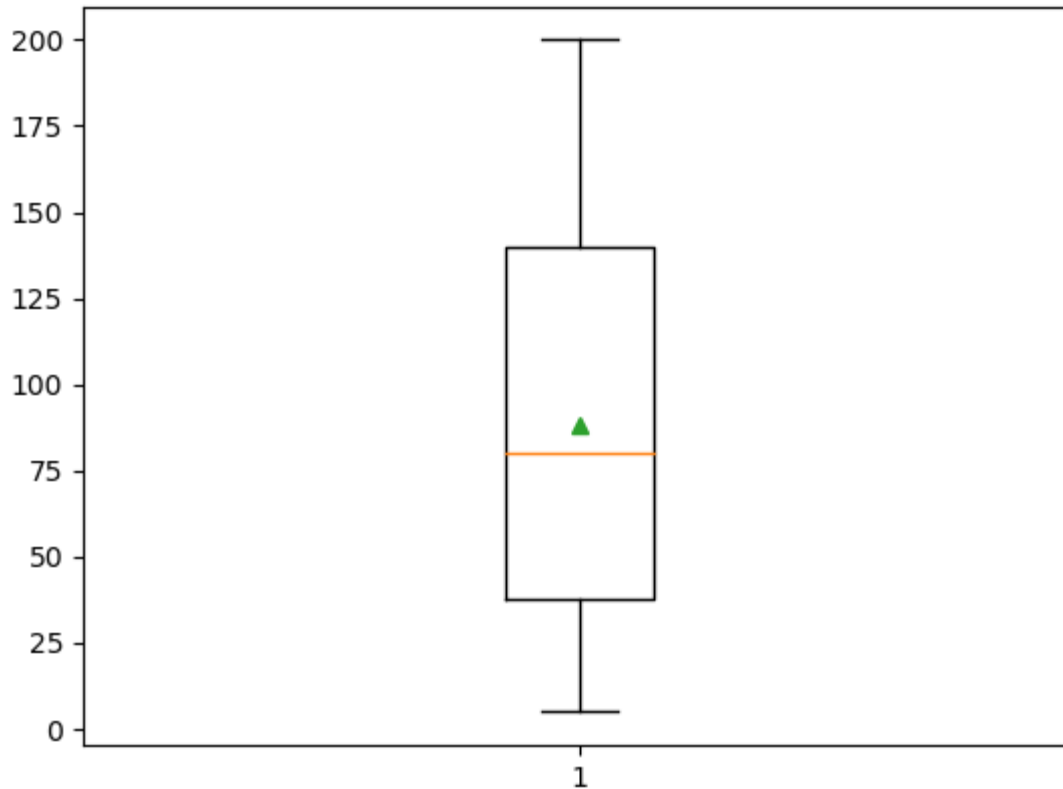
Creating Boxplot

```python
import matplotlib.pyplot as plt
ary=[5,20,30,45,60,80,100,140,150,200,140]
plt.boxplot(ary, notch=True)
plt.show()
```
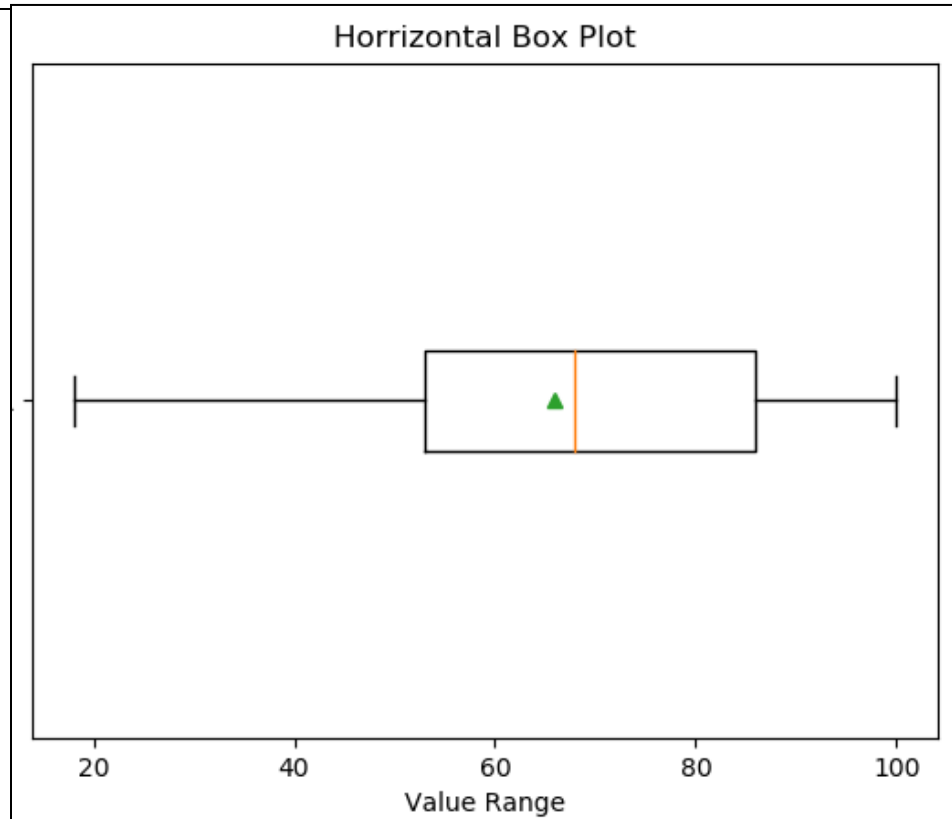
Creating Boxplot

```python
import matplotlib.pyplot as plt
ary=[5,20,30,45,60,80,100,140,150,200,140]
plt.boxplot(ary, showmeans=True)
plt.show()
```

Creating Boxplot

```python
import matplotlib.pyplot as plt
A=[34,18,100,27,54,52,93,59,61,87,68,85,78,82,91]
plt.boxplot(A,vert=False,showmeans=True)
plt.title("Horrizontal Box Plot")
plt.xlabel("Value Range")
plt.show()
```

Thank you

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