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Practical 1: Basics of NumPy and Matplotlib

In [1]:
```
import numpy as np
```

In [2]:
```
print("Hello World")
a, b = 2, 5
print(a,b)
print("Value of a =", a)
```

```
Hello World
2 5
Value of a = 2
```

In [3]:
```
str = 'Hello World!'
print (str[-1])
print (str[-3:-1])
print (str[-12:])
```

```
!
ld
Hello World!
```

In [4]:
```
list = [ 'abcd', 786 , 2.23, 'john', 70.2 ]
tinylist = [123, 'john']
print (list)
print (list[0])
print (list[1:3])
print (list[2:])
print (tinylist * 2)
print (list + tinylist)
```

```
['abcd', 786, 2.23, 'john', 70.2]
abcd
[786, 2.23]
[2.23, 'john', 70.2]
[123, 'john', 123, 'john']
['abcd', 786, 2.23, 'john', 70.2, 123, 'john']
```

In [5]:
```
tuple = ( 'abcd', 786 , 2.23, 'john', 70.2 )
tinytuple = (123, 'john')
print (tuple)
print (tuple[0])
print (tuple[1:3])
print (tuple[2:])
print (tinytuple * 2)
print (tuple + tinytuple)
```

```
('abcd', 786, 2.23, 'john', 70.2)
abcd
(786, 2.23)
(2.23, 'john', 70.2)
(123, 'john', 123, 'john')
('abcd', 786, 2.23, 'john', 70.2, 123, 'john')
```

In [6]:
```
dict = {}
dict['one'] = "This is one"
dict[2] = "This is two"
tinydict = {'name': 'john','code':6734, 'dept': 'sales'}
print (dict['one'])
print (dict[2])
print (tinydict)
print (tinydict.keys())
```

```
This is one
This is two
{'name': 'john', 'code': 6734, 'dept': 'sales'}
dict_keys(['name', 'code', 'dept'])
```

In [7]:
```
a = [[1,2,3], [4,5,6]]
print(a[0], a[1][0])
```

```
[1, 2, 3] 4
```

In [8]:
```
var1 = 100
if var1:
    print ("1 - Got a true expression value")
    print (var1)
var2 = 0
if var2:
    print ("2 - Got a true expression value")
    print (var2)
    print ("Good bye!")
```

```
1 - Got a true expression value
100
```

In [9]:
```
amount=int(input("Enter amount: "))
if amount<1000:
    discount=amount*0.05
    print ("Discount",discount)
else:
    discount=amount*0.10
    print ("Discount",discount)
```

```
Enter amount: 799
Discount 39.95
```

In [10]:
```
amount=int(input("Enter amount: "))
if amount<1000:
    discount=amount*0.05
    print ("Discount",discount)
elif amount<5000:
    discount=amount*0.10
    print ("Discount",discount)
else:
    discount=amount*0.15
    print ("Discount",discount)
print ("Net payable:",amount-discount)
```

```
Enter amount: 5999
Discount 899.85
Net payable: 5099.15
```

In [11]:
```
num=int(input("enter number"))
if num%2==0:
    if num%3==0:
        print ("Divisible by 3 and 2")
    else:
        print ("divisible by 2 not divisible by 3")
else:
    if num%3==0:
        print ("divisible by 3 not divisible by 2")
    else:
        print ("not Divisible by 2 not divisible by 3")
```

```
enter number67584
Divisible by 3 and 2
```

In [12]:
```
count = 0
while count < 11:
    print ('The count is:', count)
    count = count + 1
print ("Good bye!")
```

```
The count is: 0
The count is: 1
The count is: 2
The count is: 3
The count is: 4
The count is: 5
The count is: 6
The count is: 7
The count is: 8
The count is: 9
The count is: 10
Good bye!
```

In [13]:
```
for var in range(5):
    print(var)
```

```
0
1
2
3
4
```

In [14]:
```
for letter in 'Python':
    if letter == 'h':
        continue
    print ('Current Letter :', letter)
```

```
Current Letter : P
Current Letter : y
Current Letter : t
Current Letter : o
Current Letter : n
```

In [15]:
```
def sum___(*args):
    return sum(args)
```

In [16]:
```
print(sum___(1,2,3))
```

```
6
```

In [17]:
```
x = np.array([[1,2,3],[4,5,6]], float)
print(x, type(x))
```

```
[[1. 2. 3.]
 [4. 5. 6.]] <class 'numpy.ndarray'>
```

In [18]:
```
x = np.array(range(10), float).reshape((2,5))
print(x)
```

```
[[0. 1. 2. 3. 4.]
 [5. 6. 7. 8. 9.]]
```

In [19]:
```
x = np.array(range(10), float).reshape((5,2))
print(x, x.transpose(), sep = "\n")
```

```
[[0. 1.]
 [2. 3.]
 [4. 5.]
 [6. 7.]
 [8. 9.]]
[[0. 2. 4. 6. 8.]
 [1. 3. 5. 7. 9.]]
```

In [20]:
```
x = x.flatten()
print(x)
```

```
[0. 1. 2. 3. 4. 5. 6. 7. 8. 9.]
```

In [21]:
```
a = np.array([[1,2], [3,4]], float)
b = np.array([[4,5], [2,5]], float)
print(np.concatenate((a,b), axis = 1))
print(np.concatenate((a,b), axis = 0))
```

```
[[1. 2. 4. 5.]
 [3. 4. 2. 5.]]
[[1. 2.]
 [3. 4.]
 [4. 5.]
 [2. 5.]]
```

In [22]:
```
x.sort()
print(x.mean())
print(x.var())
print(x.std())
print(x)
print(x.min())
print(x.argmin())
print(np.median(x))
```

```
4.5
8.25
2.8722813232690143
[0. 1. 2. 3. 4. 5. 6. 7. 8. 9.]
0.0
0
4.5
```

In [23]:
```
a = np.array([[1,2,3,4,5], [2,3,4,5,5]], float)
np.corrcoef(a)
np.cov(a)
```

Out[23]:
```
array([[2.5, 2. ],
       [2. , 1.7]])
```

In [27]:
```
print(x[x>=6])
print([x>=6])
```

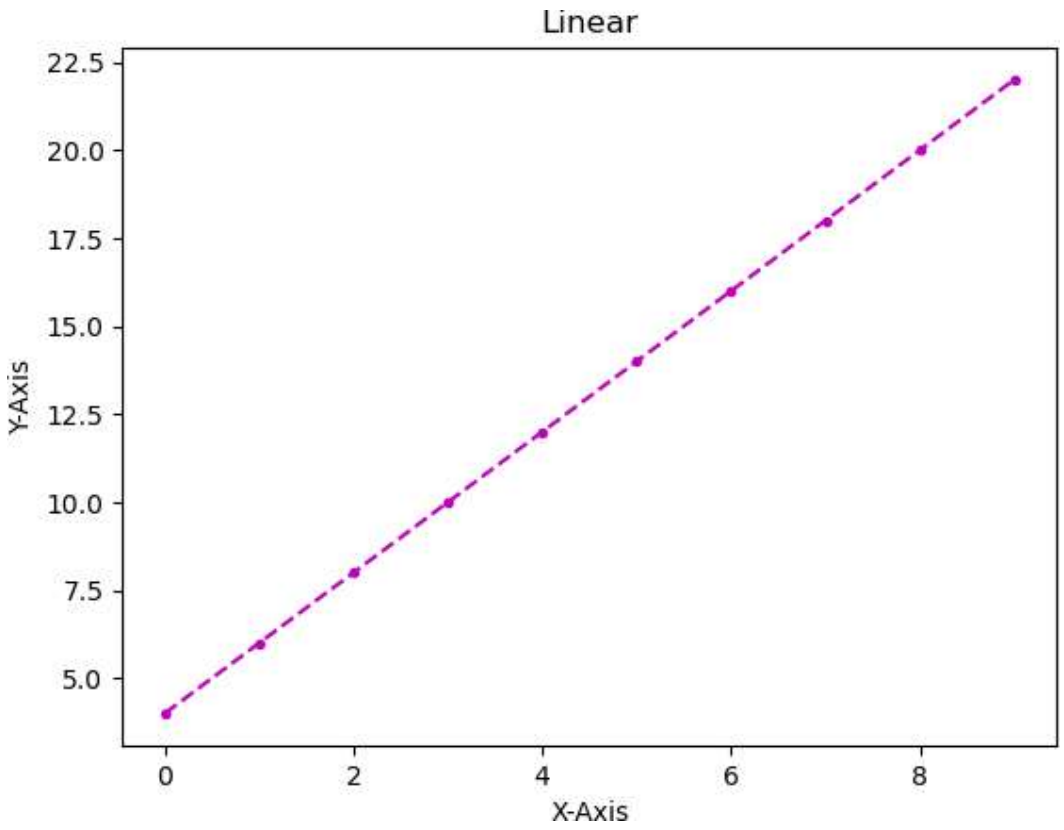
```
[6. 7. 8. 9.]
[array([False, False, False, False, False, False,  True,  True,  True,
        True])]
```

In [1]:
```
import matplotlib.pyplot as plt
import numpy as np
```

In [2]:
```
x = np.arange(0,10)
```

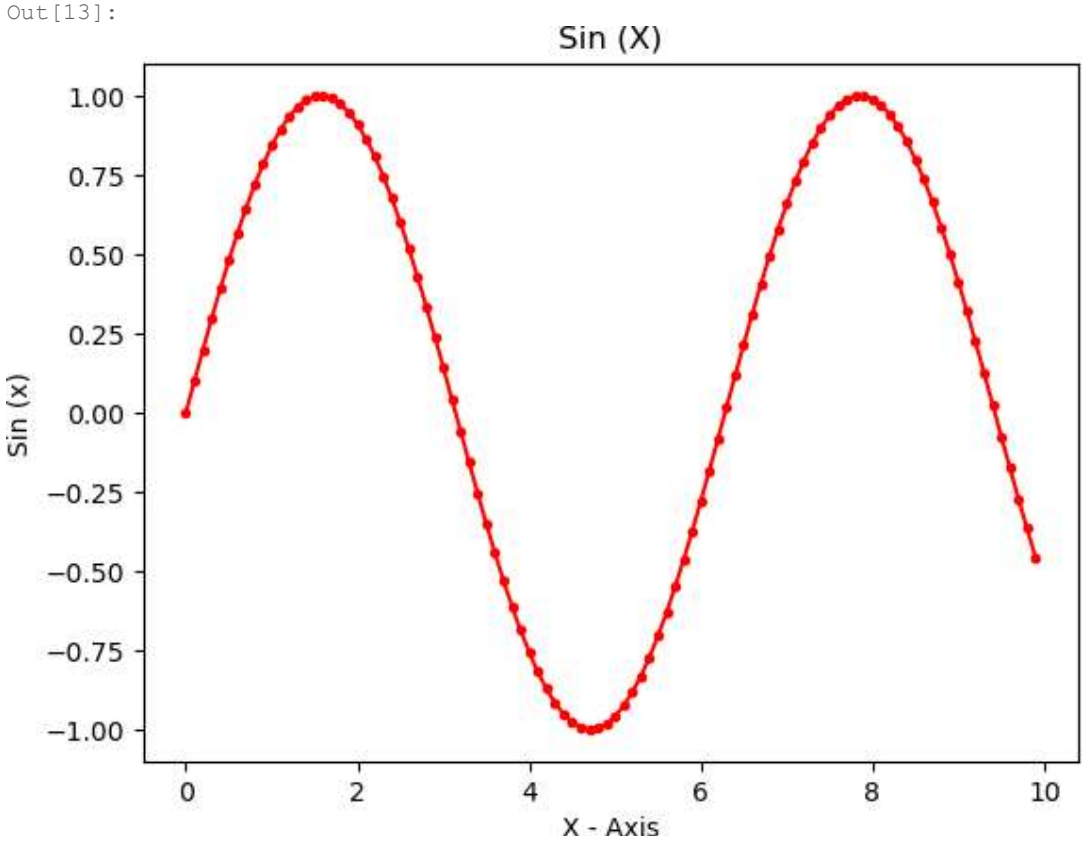
In [11]:
```
y = 2*x + 4
plt.title("Linear")
plt.xlabel("X-Axis")
plt.ylabel("Y-Axis")
plt.plot(x, y, color='m', linestyle='--', marker='.')
```

Out[11]:



In [13]:
```
x = np.arange(0,10, 0.1)
y = np.sin(x)
plt.title("Sin (X)")
plt.xlabel("X - Axis")
plt.ylabel("Sin (x)")
plt.plot(x,y, linestyle='-', marker='.', color='r')
```

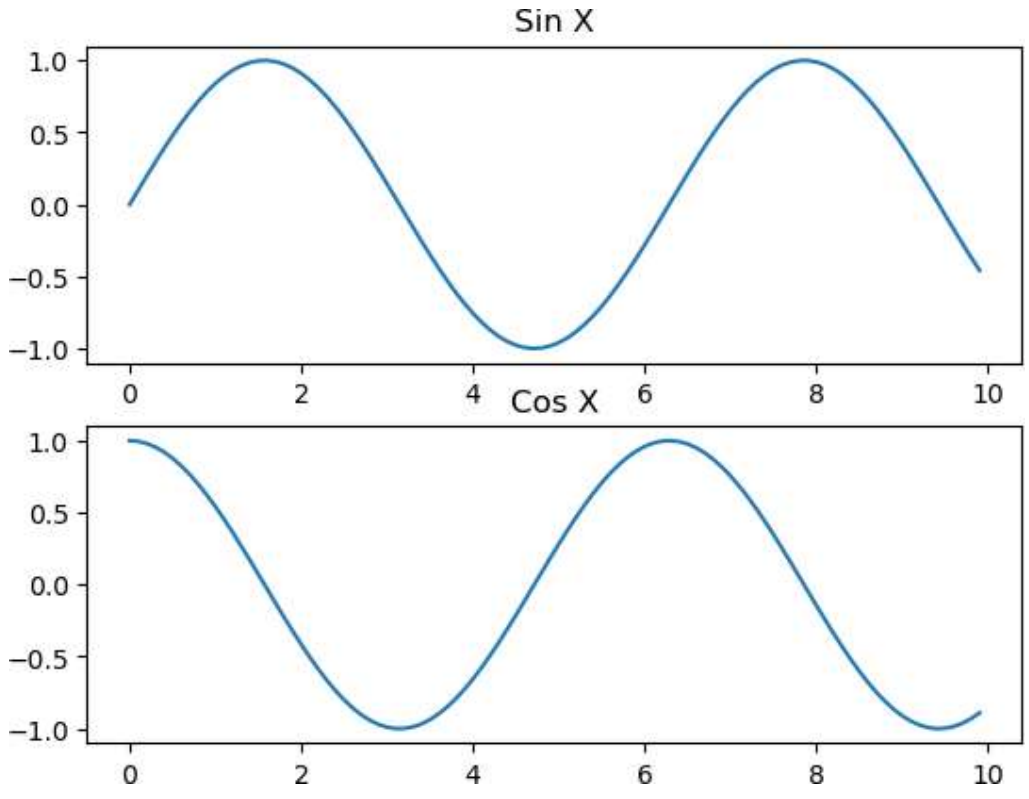
Out[13]:



In [14]:

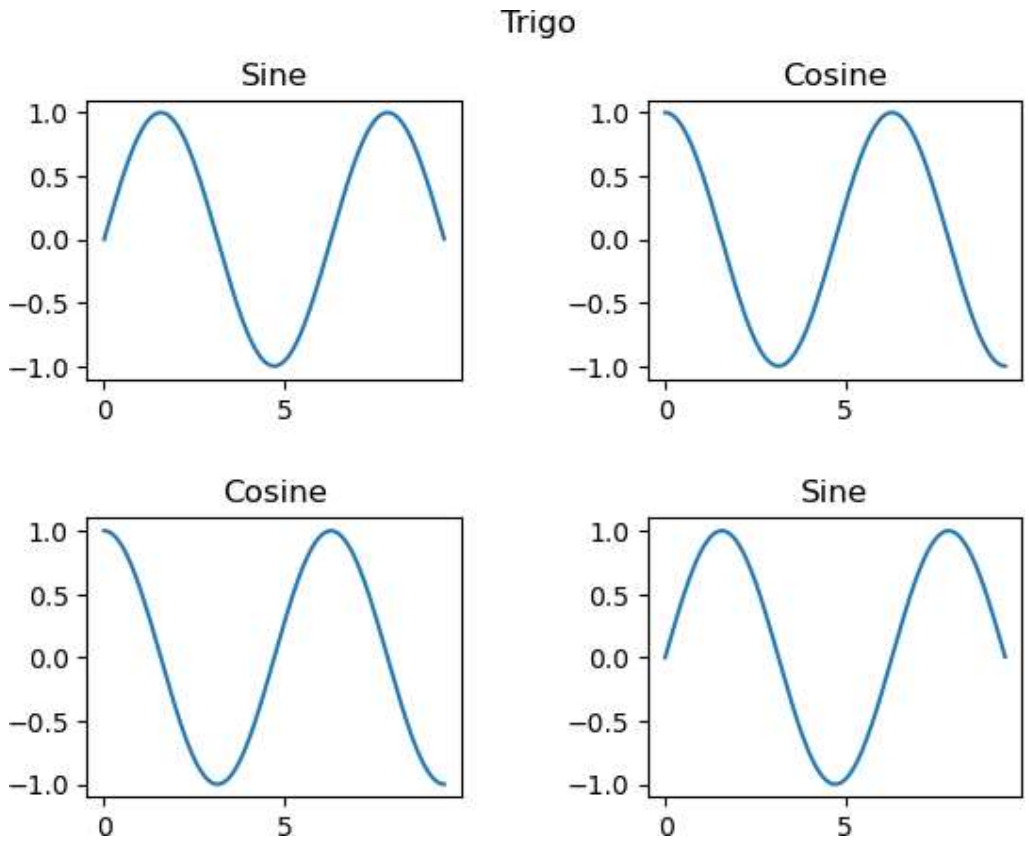
```
plt.subplot(2,1,1)
plt.title("Sin  X")
plt.plot(x,y)
plt.subplot(2,1,2)
plt.title("Cos  X")
plt.plot(x,  np.cos(x))
```

Out[14]:



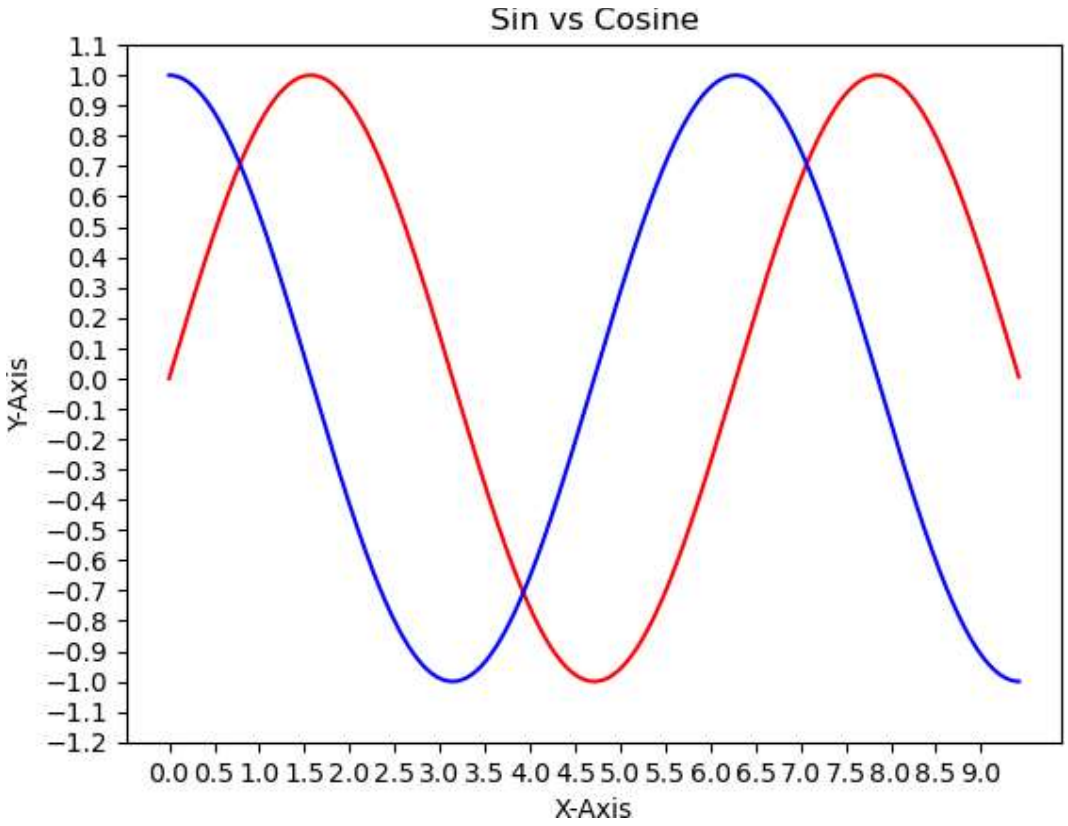
In [21]:
```
x = np.arange(0, 3*np.pi, 0.01)
sin = np.sin(x)
cos = np.cos(x)
plt.subplot(2,2,1)
plt.plot(x, sin)
plt.title("Sine")
plt.subplot(2,2,2)
plt.plot(x, cos)
plt.title("Cosine")
plt.subplot(2,2,3)
plt.plot(x, cos)
plt.title("Cosine")
plt.subplot(2,2,4)
plt.plot(x, sin)
plt.title("Sine")

plt.subplots_adjust(hspace=0.5, wspace = 0.5)
plt.suptitle("Trigo")
```

Out[21]:



In [28]:
```
y = np.sin(x)
z = np.cos(x)
plt.title("Sin vs Cosine")
plt.xlabel("X-Axis")
plt.ylabel("Y-Axis")
plt.plot(x, y, color='r', label="Sin")
plt.plot(x, z, color='b', label="Cos")
plt.xticks(np.arange(0,3*np.pi, 0.5))
plt.yticks(np.arange(-1.2,1.2, 0.1))
```

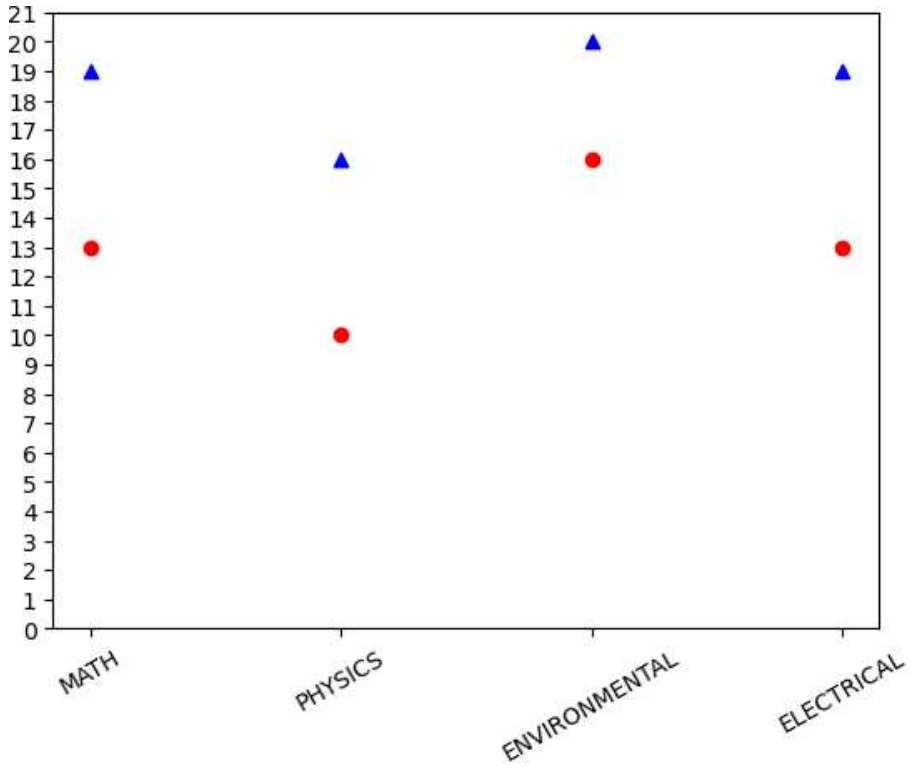
Out[28]:



In [32]:

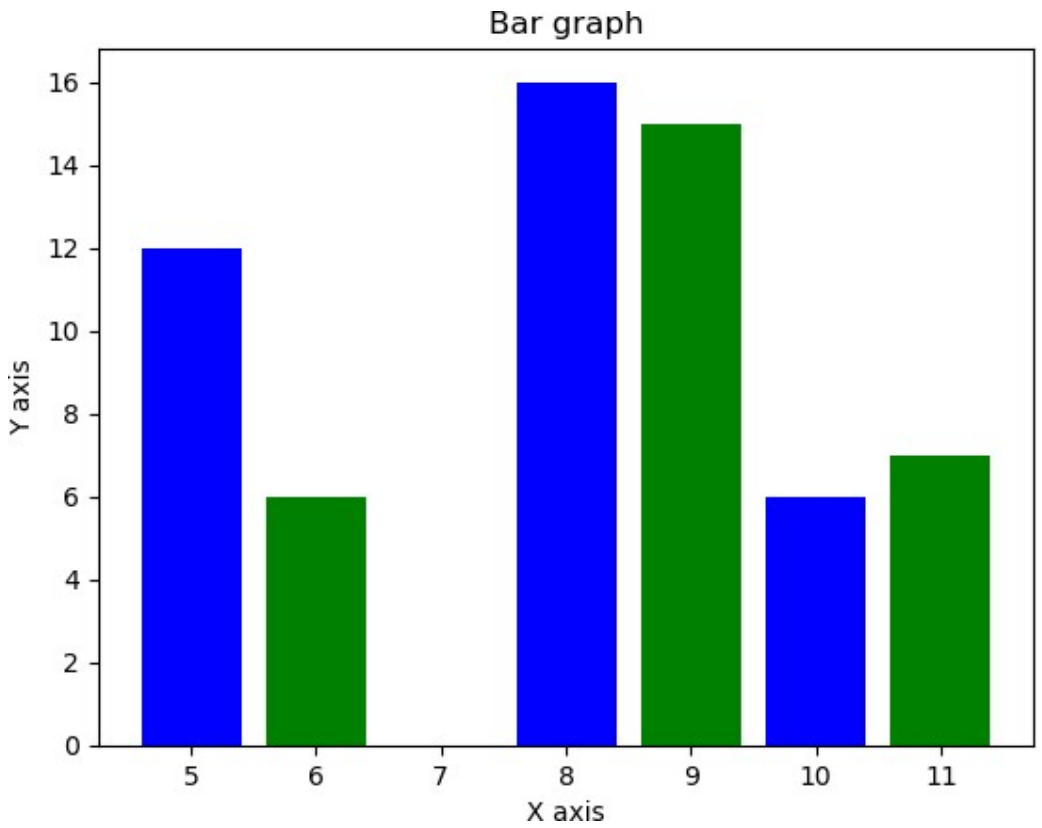
```
s1 = [19, 16, 20, 19]
s2 = [13, 10, 16, 13]
sub = ['MATH', "PHYSICS", "ENVIRONMENTAL", "ELECTRICAL"]
plt.scatter(np.arange(0, 4), s1, label="Student - 1", color='b', marker='^')
plt.scatter(np.arange(0, 4), s2, label="Student - 1", color='r', marker='o')
plt.xticks(np.arange(0,4), sub, rotation=30)
plt.yticks(np.arange(0,22, 1))
```

Out[32]:

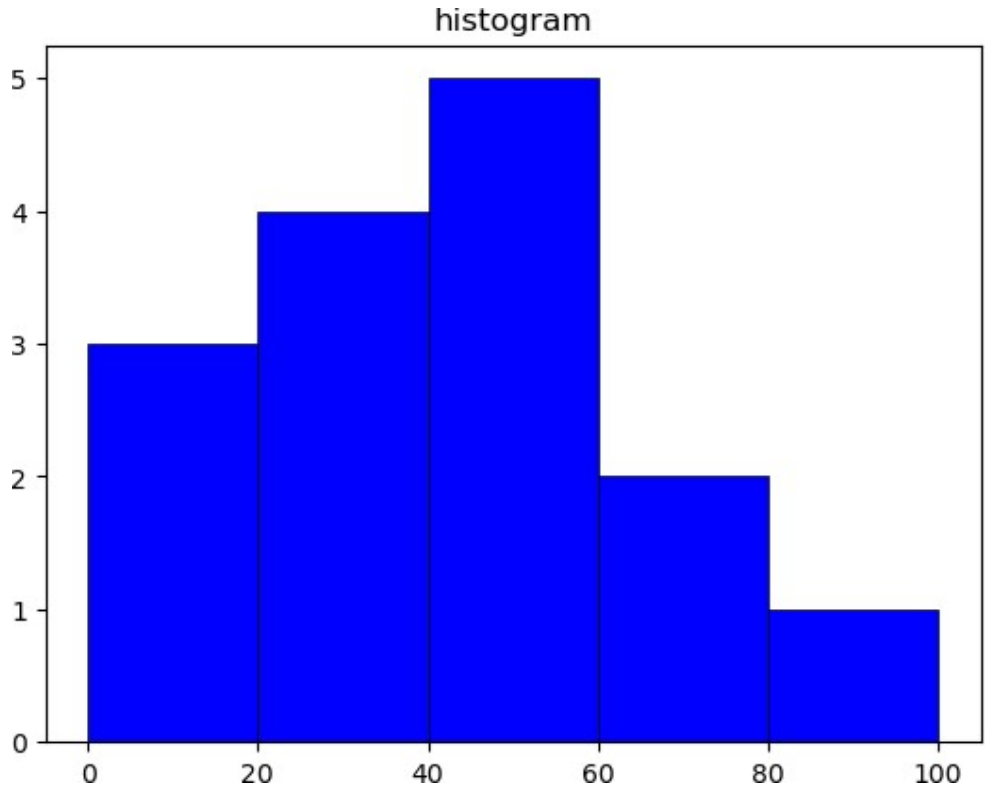


In [34]:
```
x = [5, 8, 10]
y = [12, 16, 6]
x2 = [6, 9, 11]
y2 = [6, 15, 7]

plt.bar(x, y, color = 'b', align = 'center')
plt.bar(x2, y2, color = 'g', align = 'center')
plt.title('Bar graph')
plt.ylabel('Y  axis')
plt.xlabel('X  axis')
plt.show()
```

Out[34]:



In [35]:
```
a  =  np.array([22,87,5,43,56,73,55,54,11,20,51,5,79,31,27])
plt.hist(a, bins = [0,20,40,60,80,100], color = 'b', edgecolor='k', linewidt
plt.title("histogram")
plt.show()
```



In [2]:
```
import cv2
```

In [3]:
```
cv2.imshow("HEHE",cv2.imread("copy.jpg"))
cv2.imwrite("copy.jpg",cv2.imread("N3.jpeg"))
```

Out[3]:
```
True
```

In [7]:
```
import pandas as pd
import numpy as np
data=pd.read_csv('data.csv',header=None)
data=data.values
print(data)
```

```
[['Student_id' 'Age' 'Grade' 'Employed' 'marks']
 ['1' '19' '1st Class' 'yes' '29']
 ['2' '20' '2nd Class' 'no' '41']
 ...
 ['230' '20' '3rd Class' 'yes' '21']
 ['231' '19' '1st Class' 'yes' '64']
 ['232' '20' '3rd Class' 'yes' '30']]
```

In [9]:
```
a = np.array([ [1,2,3], [4,5,6], [7,8,9] ])
df = pd.DataFrame(a)
df.to_csv("file.csv", header=None, index=False)
df
```

Out[9]:

	0	1	2
0	1	2	3
1	4	5	6
2	7	8	9