Name - L.H.N.WIJEWARDENA Index - 190713X

In [ ]:
```
#question 1
for i in range(1,6):
  print(i,":",i**2)
```

```
1 : 1
2 : 4
3 : 9
4 : 16
5 : 25
```

In [ ]:
```
#question 2
import sympy
for i in range(1,6):
  if not sympy.isprime(i):
    print(i,":",i**2)
```

```
1 : 1
4 : 16
```

In [ ]:
```
#question 3
squares = [i**2 for i in range(1,6)]
for i,i2 in enumerate(squares):
  print(i+1,i2)
```

```
1 1
2 4
3 9
4 16
5 25
```

In [ ]:
```
#question 4
import sympy
squares = [i**2 for i in range (1,6) if not sympy.isprime(i)]
print(squares)
```

```
[1, 16]
```

In [ ]:
```
#question 5a
import numpy as np
a= np.array([[1,2],[3,4],[5,6]])
b= np.array([[7,8,9,1],[1,2,3,4]])
c= np.matmul(a,b)
print(c)
```

```
[[ 9 12 15  9]
 [25 32 39 19]
 [41 52 63 29]]
```

In [ ]:
```
#question 5b
a= np.array([[1,2],[3,4],[5,6]])
b= np.array([[3,2],[5,4],[3,1]])
print(np.multiply(a,b))
```

```
[[ 3  4]
 [15 16]
 [15  6]]
```

In [ ]:
```
#question 6
rand_array=10*(np.random.rand(5,7)) # random array of 5x7
print(rand_array)
new_array=rand_array[2:5,0:2] #slicing
print(new_array)
print(new_array.shape) #size
```

```
[[2.10679257 0.72292613 8.4948155  7.40728152 4.94193362 0.01973159
  7.43698973]
 [1.56198974 1.35292158 8.36776717 0.75466403 3.42809551 0.39751907
  7.80089798]
 [7.7308617  4.96334406 8.15385443 0.0687307  0.18166183 1.74445913
  0.6749491 ]
 [1.2350822  7.95329354 8.46605238 9.13004022 0.17698511 7.88003643
  1.04428636]
 [6.27864013 7.30703106 8.35028306 1.43679364 3.57536597 5.08578631
  2.6191517 ]]
[[7.7308617  4.96334406]
 [1.2350822  7.95329354]
 [6.27864013 7.30703106]]
(3, 2)
```

In [ ]:
```
#question 7 example 1
a= np.array([2,3,4])
b = 2
a*b  #b is broadcasted
```

Out[ ]:
```
array([4, 6, 8])
```

In [ ]:
```
#question 7 example 2
a=np.array([[1,2,3],[4,5,6]])
b = np.array([2,2,2])
a+b #b is broadcasted
```

Out[ ]:
```
array([[3, 4, 5],
       [6, 7, 8]])
```

In [ ]:
```
#question 7 example 3
a=np.array([[2,4],[5,6]])
b= 3
a+b #b is broadcasted
```

Out[ ]:
```
array([[5, 7],
       [8, 9]])
```

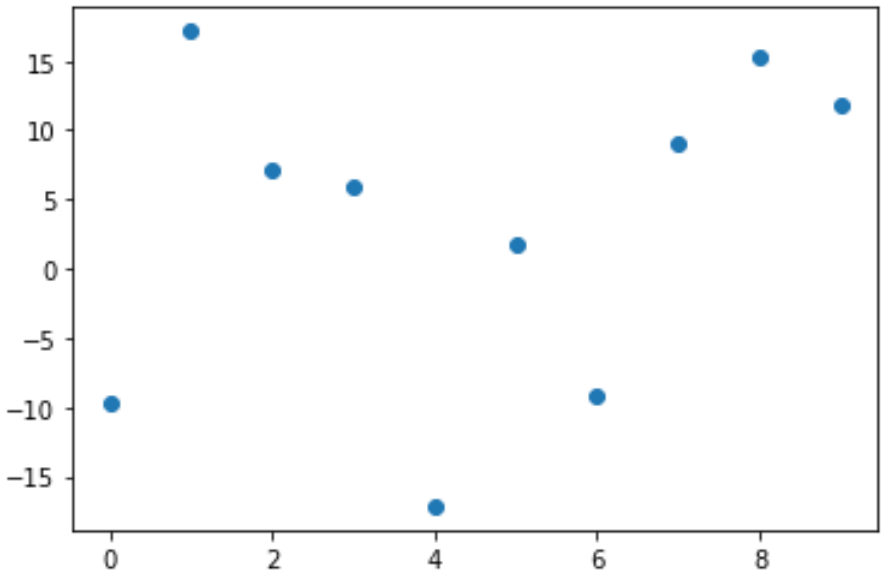
In [ ]:
```
#question 8
import numpy as np
from numpy import linalg
import matplotlib.pyplot as plt

m,c = 2,-4
N=10
x = np . linspace (0 , N-1, N) . reshape (N, 1 )
sigma = 10
y = m*x + c + np . random . normal (0 , sigma , (N, 1 ) )
plt.scatter(x,y)

X= np.append(np.ones((N,1)),x,axis=1)

w=linalg.inv(X.T @ X) @ X.T @ y
w
```

Out[ ]:
```
array([[-1.2318969 ],
       [ 0.98652629]])
```



In [ ]:
```
#question 10
```

```
import cv2 as cv
im= cv.imread(r'C:\Users\HIRUNI\Desktop\EN2550\gal_gaussian.png')
blur = cv.GaussianBlur(im,(5,5),0)
cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
cv.imshow('Image',im)
cv.waitKey(0)
cv.imshow('Image',blur)
cv.waitKey(0)
cv.destroyAllWindows()
```

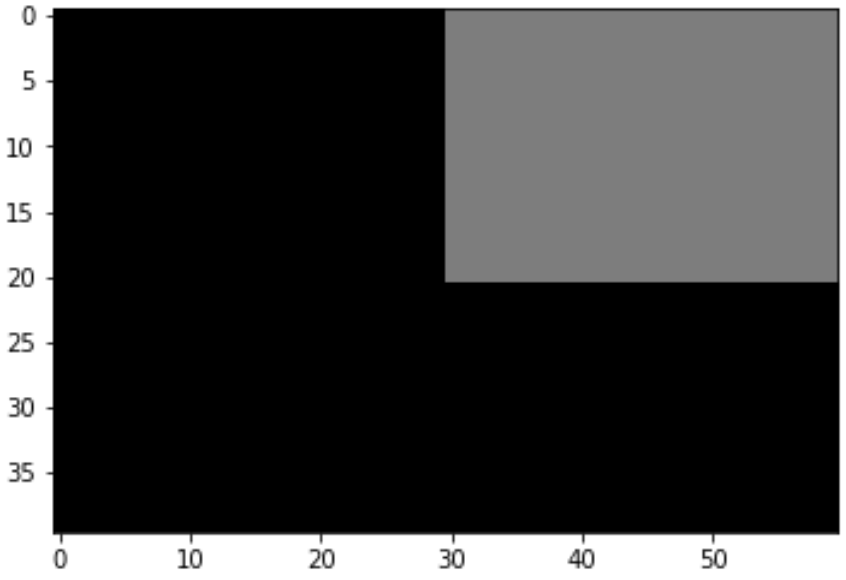
In [ ]:

```
#question 11
import cv2 as cv
im= cv.imread(r'C:\Users\HIRUNI\Desktop\EN2550\gal_sandp.png')
blur=cv.medianBlur(im,5)
cv.namedWindow('Image',cv.WINDOW_AUTOSIZE)
cv.imshow('Image',im)
cv.waitKey(0)
cv.imshow('Image',blur)
cv.waitKey(0)
cv.destroyAllWindows()
```

In [ ]:

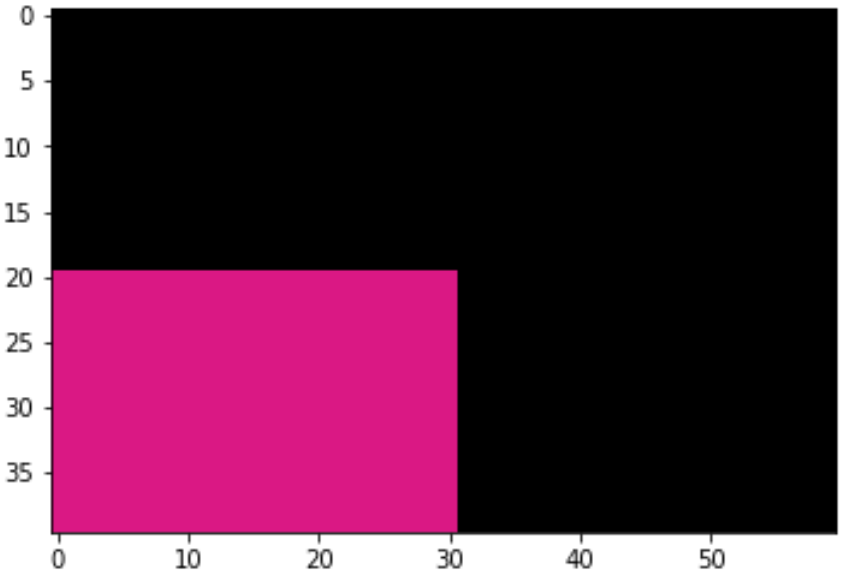
```
#question 12
import numpy as np
import cv2 as cv

im=np.zeros((40,60),dtype=np.uint8)
im[0:21 , 30:61] = 125
fig,ax = plt.subplots()
ax.imshow(im, cmap='gray',vmin=0, vmax=255)
plt.show()
```



In [ ]:
```
#question 13
import numpy as np
import cv2 as cv

data = np.zeros((40, 60, 3), dtype=np.uint8)
data[20:41, 00:31] = [218 ,24, 132] # Barbie pink patch in bottom left
fig,ax = plt.subplots()
ax.imshow(data)
plt.show()
```



In [ ]:
```
#question 14
im= cv.imread(r'C:\Users\HIRUNI\Desktop\EN2550\tom_dark.jpg')
im = im+100 # increase the brighness by 100
cv.imshow('Image',im)
cv.waitKey(0)
cv.destroyAllWindows()
```