

▼ Name : W.M. Limalka Sadith

Index Number : 190538N

```
1 for i in range(1,6):
2     print(i,":",i**2)
```

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

```
1 import sympy
2 for i in range(1,6):
3     if not sympy.isprime(i):
4         print(i,":",i**2)
```

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

```
1 print(*[str(i)+" : " + str(i**2) for i in range(1,6)],sep = "\n")
```

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

```
1 print(*[str(i)+" : " + str(i**2) for i in range(1,6) if not sympy.isprime(i)],sep= "\n")
```

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

```
1 import numpy as np
2
3 A = np.array([[1, 2],[3, 4],[5, 6]])
4 B = np.array([[7,8,9,1],[1, 2, 3, 4]])
5 C = np.dot(A,B)
6 print(C)
```

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

```
1 A = np.array([[1, 2],[3, 4],[5, 6]])
2 B = np.array([[3, 2],[5, 4],[3, 1]])
3 C = np.multiply(A,B)
4 print(C)
```

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

```
1 a = np.random.randint(1,10,(5,7))
2 b = a[2:4,:2]
3 print(a)
4 print("-----")
5 print(b)
6 print("-----")
7 print("Size = 2 x 2")
```

```
[[5 2 6 1 8 2 8]
 [7 3 1 6 1 8 7]
 [9 4 5 4 2 1 8]
 [5 9 3 2 6 9 1]
 [9 5 6 2 1 4 3]]
-----
[[9 4]
 [5 9]]
-----
Size = 2 x 2
```

```
1 #example 1 for broadcasting
2 a = np.array([1,2,3]) # 1,3
3 b = np.array([1,2,3]).reshape(3,1) #3,1
```

```
4 print(a,b,sep="\n")
5 a+b #resulting shape = 3,3
```

```
[1 2 3]
[[1]
 [2]
 [3]]
array([[2, 3, 4],
       [3, 4, 5],
       [4, 5, 6]])
```

```
1 #example 2 for broadcasting
2 a = np.array([[1,2,3],[1,2,3],[1,2,3]]) # 3,3
3 b = np.array([1,2,3]) #3,1
4 print(a,b,sep="\n-----\n")
5 a+b #resulting shape = 3,3
```

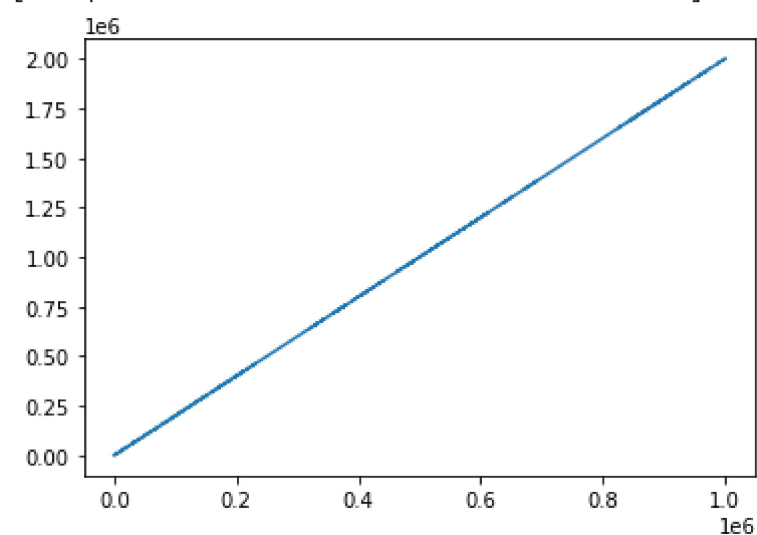
```
[[1 2 3]
 [1 2 3]
 [1 2 3]]
-----
[1 2 3]
array([[2, 4, 6],
       [2, 4, 6],
       [2, 4, 6]])
```

```
1 #example 3 for broadcasting
2 a = np.array([[1,2,3],[1,2,3],[1,2,3]]) # 3,3
3 b = np.array([1]) #1,1
4 print(a,b,sep="\n-----\n")
5 a+b #resulting shape = 3,3
```

```
[[1 2 3]
 [1 2 3]
 [1 2 3]]
-----
[1]
array([[2, 3, 4],
       [2, 3, 4],
       [2, 3, 4]])
```

```
1 import matplotlib.pyplot as plt
2 m, c = 2 , 4
3 N = 1000000
4 x = np . linspace (0 , N-1, N) . reshape (N, 1 )
5 sigma = 10
6 y = m*x + c + np . random . normal (0 , sigma , (N, 1 ) )
7 plt.plot(x,y)
```

[<matplotlib.lines.Line2D at 0x7fd02a680350>]



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

```
1 from numpy.linalg import inv
2 inv(np.dot(X.T,X))@X.T@y
3
```

```
array([[3.96073974],
       [2.00000006]])
```

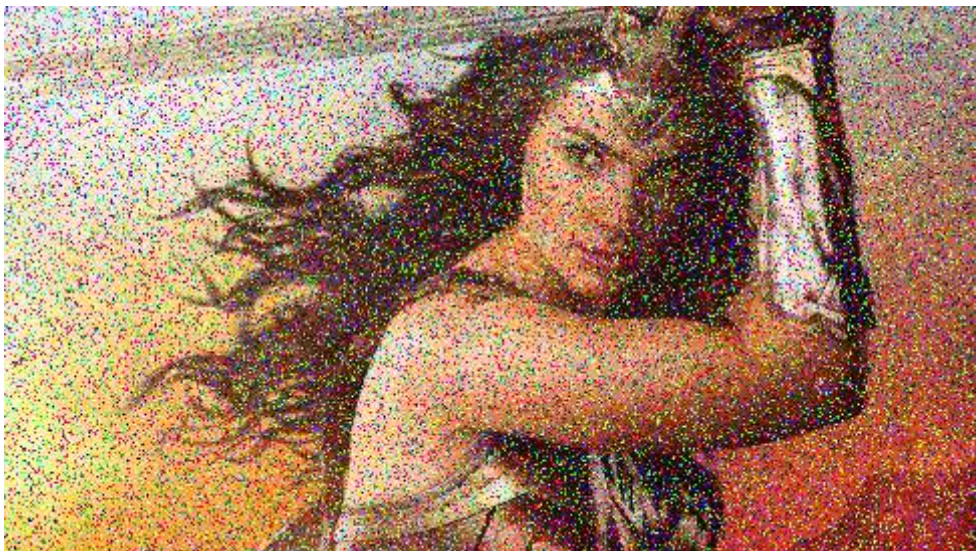
```
1 import cv2 as cv
2 from google.colab.patches import cv2_imshow as imshow
3 # % cd "/content/drive/MyDrive/My UoM Docs/ENTC/Semester 4/IPMV Excercise 1"
4 ! ls
```

```
1 img1 = cv.imread('gal_gaussian.png')
2 img2 = cv.imread('gal_sandp.png')
3 img3 = cv.imread('tom_dark.jpg')
```

```
1 blur = cv.GaussianBlur(img1,(5,5),0)
2 imshow(img1)
3 imshow(blur)
```



```
1 median = cv.medianBlur(img2,5)
2 imshow(img2)
3 imshow(median)
```



```
1 img4 = np.zeros((40,60),dtype=np.uint8)
2 img5 = np.zeros((40,60),dtype=np.uint8)
3 img6 = np.zeros((40,60,3),dtype=np.uint8)
4 img5[:21,30:] = 125
5 # B G R
6 img6[21:,:31,0],img6[21:,:31,1],img6[21:,:31,2] = 0x84, 0x18, 0xDA #DA1884 - for barbie pink
7 imshow(img4)
8 print("-----")
9 imshow(img5)
10 print("-----")
11 imshow(img6)
```





```
1 new_img = np.zeros(img3.shape, img3.dtype)
2 a = 2 #alpha
3 b = 2 #beta
4 for i in range(img3.shape[0]):
5     for j in range(img3.shape[1]):
6         for k in range(img3.shape[2]):
7             new_img[i,j,k] = np.clip(a*img3[i,j,k] + b, 0, 255)
8
9 imshow(img3)
10 print("-----")
11 imshow(new_img)
```



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