

## EN2550 Homework 1

Index No. : 190018V

Name : Abeywickrama K.C.S.

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

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

```
In [2]: # 2
        from sympy import isprime

        for i in range(1,6):
            if not isprime(i):
                print(i,':',i**2)
```

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

```
In [3]: # 3
        n=[i**2 for i in range(1,6)]

        for i,ii in enumerate(n):
            print(i+1,":",ii)
```

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

```
In [4]: # 4
        n=[i**2 for i in range(1,6) if not isprime(i)]

        for i,ii in enumerate(n):
            print(i+1,":",ii)
```

```
1 : 1
2 : 16
```

```
In [28]: # imports
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt

def _imshowBGR(img):
    plt.figure()
    plt.imshow(img[:,::-1])

plt.imshowBGR=lambda img: _imshowBGR(img)
```

```
In [2]: # 5.a

A=np.array([[1,2],[3,4],[5,6]])
B=np.array([[7,8,9,1],[1,2,3,4]])
```

```
C=A @ B
print(C)
```

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

```
In [8]: # 5.b
A=np.array([[1,2],[3,4],[5,6]])
B=np.array([[3,2],[5,4],[3,1]])
C=A*B
print(C)
```

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

```
In [19]: # 6
R=np.random.randint(11,size=(5,7))
print(R)
subR=R[1:4,0:2]
print(subR)
print(subR.shape)
```

```
[[ 2  3  0  2  4  6  2]
 [10  0  9  2  8  3  9]
 [10  2  2  6 10  0  6]
 [ 4  7  9  2  0  2 10]
 [ 0  7  3  0 10 10  0]]
[[10  0]
 [10  2]
 [ 4  7]]
(3, 2)
```

```
In [28]: # 7
a=np.zeros((3,4),dtype=int)
b=np.ones((3,1),dtype=int)
c=np.ones((1,4),dtype=int)
d=1

print("a")
print(a)

print("\nb")
print(b)
print("a+b")
print(a+b)

print("\nc")
print(c)
print("a+c")
print(a+c)

print("\nd")
print(d)
print("a+d")
print(a+d)
```

```
a
[[0 0 0 0]
 [0 0 0 0]
 [0 0 0 0]]
```

```
b
[[1]
 [1]
 [1]]
a+b
[[1 1 1 1]
 [1 1 1 1]
 [1 1 1 1]]
```

```
c
[[1 1 1 1]]
a+c
[[1 1 1 1]
 [1 1 1 1]
 [1 1 1 1]]
```

```
d
1
a+d
[[1 1 1 1]
 [1 1 1 1]
 [1 1 1 1]]
```

In [4]:

```
# 8

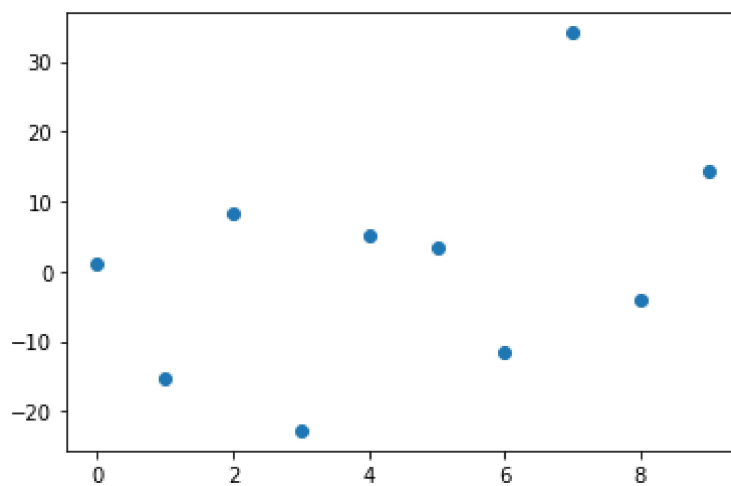
m,c=2,-4
N=10
x=np.linspace(0,N-1,N).reshape(N,1)
print(x)
sigma=10
y=m*x+c+np.random.normal(0,sigma,(N,1))
plt.scatter(x,y)
X=np.append(np.ones((N,1)),x,axis=1)
print(X)

C=np.linalg.inv(X.T @ X) @ X.T @ y
print(C)
```

```

[[0.]
 [1.]
 [2.]
 [3.]
 [4.]
 [5.]
 [6.]
 [7.]
 [8.]
 [9.]]
[[1. 0.]
 [1. 1.]
 [1. 2.]
 [1. 3.]
 [1. 4.]
 [1. 5.]
 [1. 6.]
 [1. 7.]
 [1. 8.]
 [1. 9.]]
[[-8.51269172]
 [ 2.17903864]]

```



In [30]:

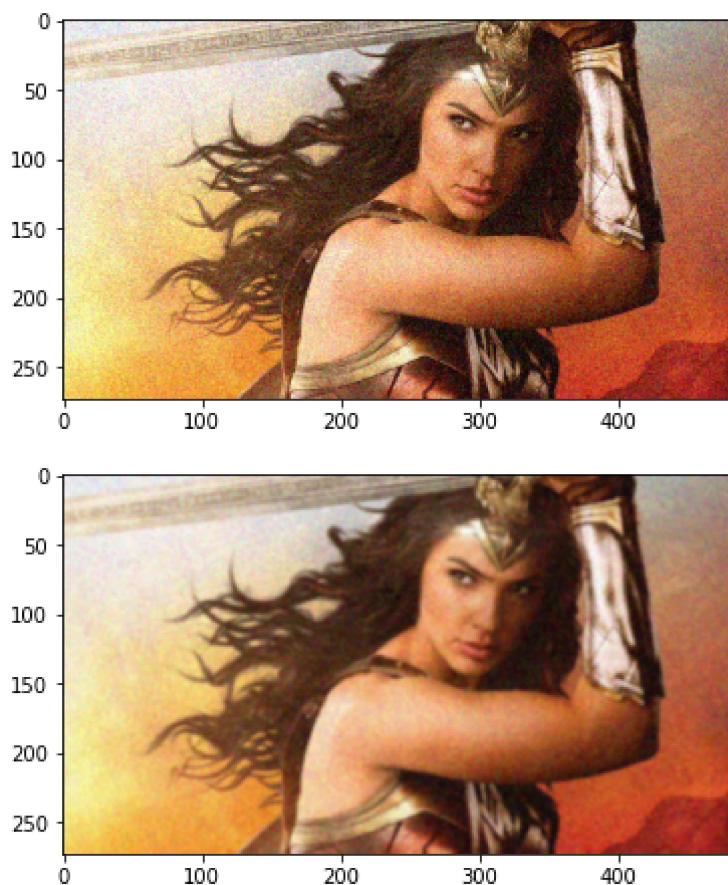
```

# 10

im=cv.imread('gal_gaussian.png')
cv.namedWindow('im')
cv.imshow('im',im)
cv.waitKey(0)
blur=cv.GaussianBlur(im,(5,5),0)
cv.imshow('im',blur)
cv.waitKey(0)
cv.destroyAllWindows()

plt.imshowBGR(im)
plt.imshowBGR(blur)

```

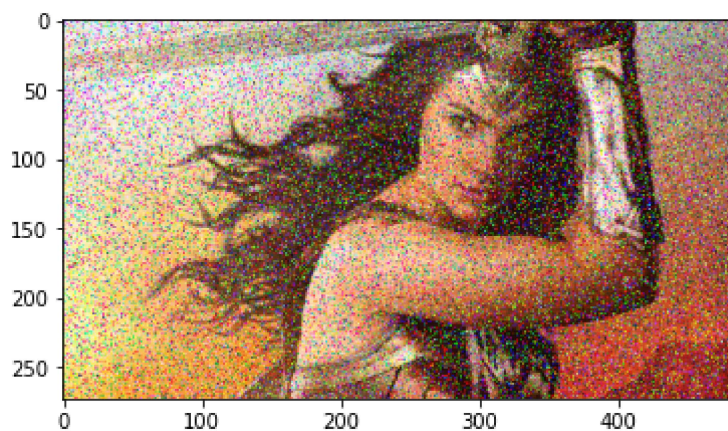


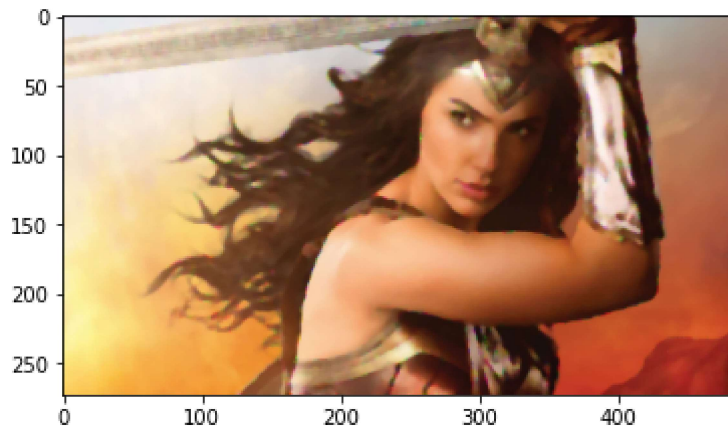
In [31]:

# 11

```
im=cv.imread('gal_sandp.png')
cv.namedWindow('im')
cv.imshow('im',im)
cv.waitKey(0)
blur=cv.medianBlur(im,5)
cv.imshow('im',blur)
cv.waitKey(0)
cv.destroyAllWindows()

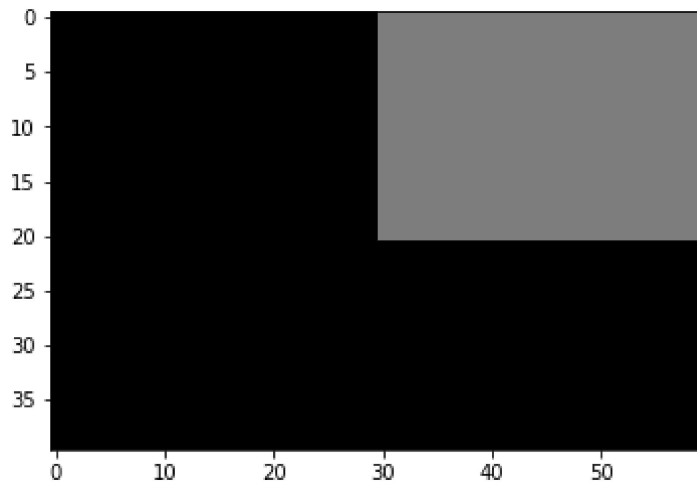
plt.imshowBGR(im)
plt.imshowBGR(blur)
```



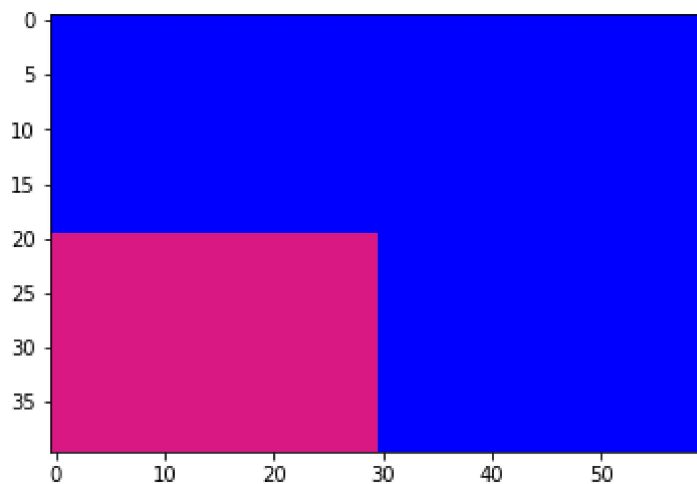


```
In [10]: # 12
im=np.zeros((40,60),dtype=np.uint8)
im[:21, 30:]=125
plt.imshow(im,cmap='gray',vmin=0,vmax=255)
```

Out[10]: <matplotlib.image.AxesImage at 0x229ada01db0>



```
In [32]: # 12
im=np.zeros((40,60,3),dtype=np.uint8)
im[:]=0,0,255
im[20:, :30]=218, 24, 132
plt.imshow(im)
```



```
In [59]: # 13
im=cv.imread('tom_dark.jpg')
imbr=np.zeros(im.shape,im.dtype)
```

```
beta=40
for x in range(im.shape[0]):
    for y in range(im.shape[1]):
        imbr[x,y]=np.clip(im[x,y]+beta,0,255)

cv.imshow('im',im)
cv.waitKey(0)

cv.imshow('im',imbr)
cv.waitKey(0)

cv.destroyAllWindows()

plt.imshowBGR(im)
plt.imshowBGR(imbr)
```

