EXPERINMENT 2

Aim : To study arithmetic and logical operations on images, log transformation and power law transformation.

❖ Exercise :

1. **In a survaillance system, two frames of the captured videos are given as image '1.jpg' and '2.jpg' Apply image subtraction to locate the foreground**.
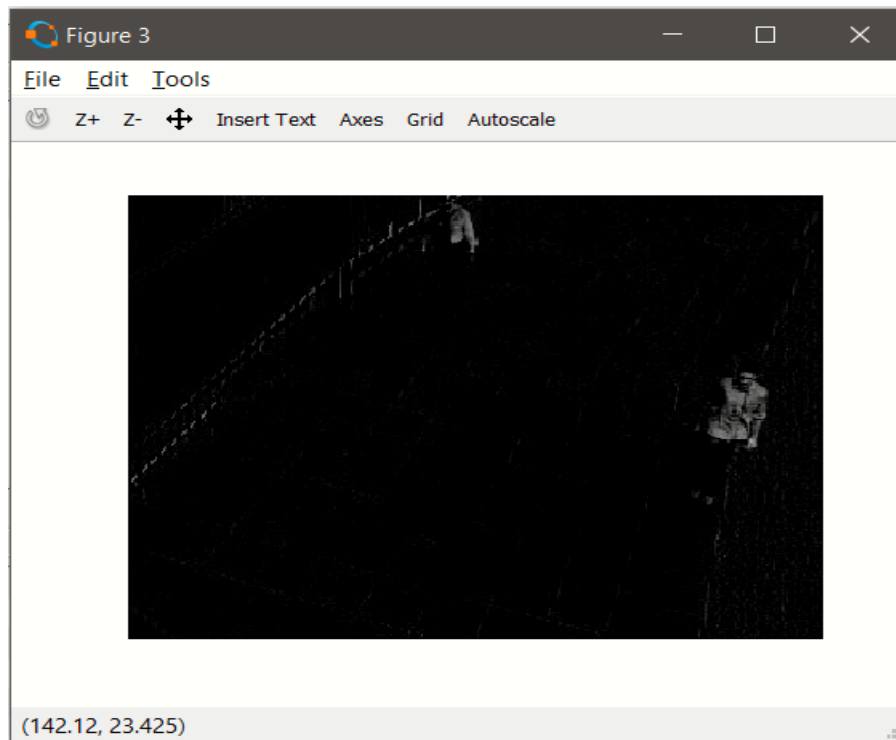
→ Solution :-

Code :

```
1  clear
2  clc
3
4  % Read images
5  img1 = imread('E:\SEM 7\IP\Lab_2_exercise_images\1.jpg');
6  img2 = imread('E:\SEM 7\IP\Lab_2_exercise_images\2.jpg');
7
8  figure
9  imshow(img1)
10
11 figure
12 imshow(img2)
13
14 c = img2- img1;
15 figure
16 imshow(c)
17
18 c = img1- img2;
19 figure
20 imshow(c)
```
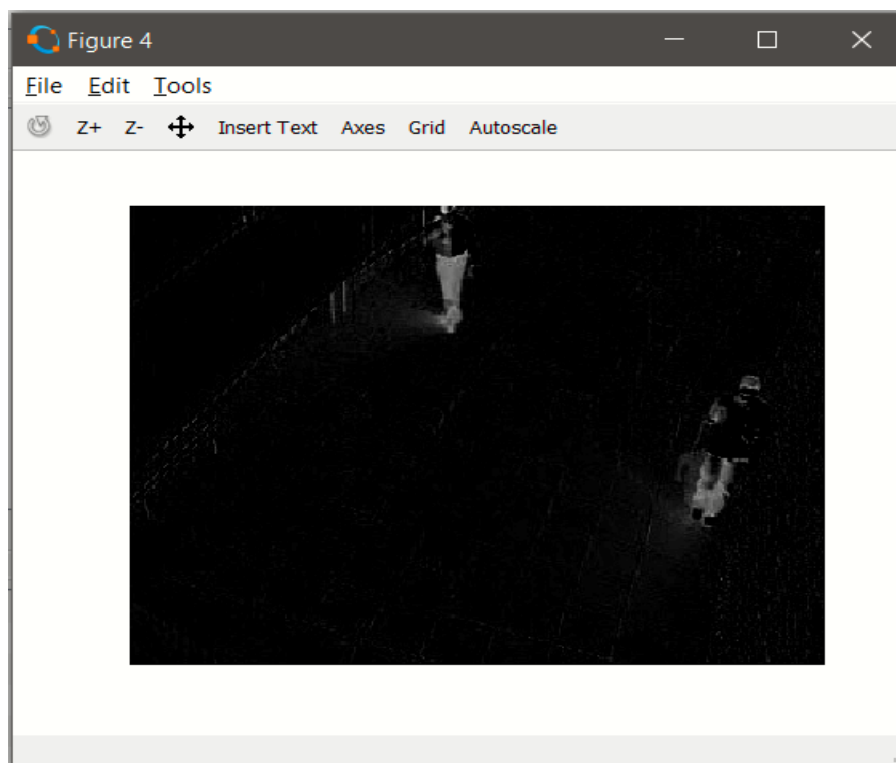
Input Images :
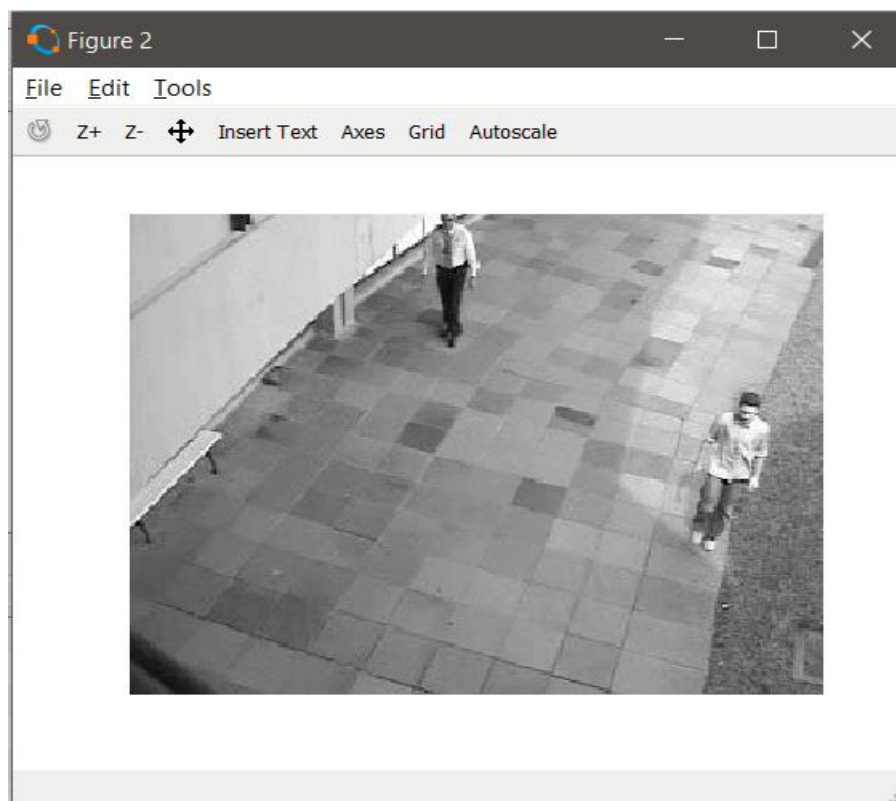
Output Images :

Img2 – Img1

Img1 – Img2

2. **Take your own black and white photo. Resize it to 256x256. Also consider given image 3.jpg. Demonstrate the logical operations like 'and', 'or', 'not' using these two images . Justify the results.**
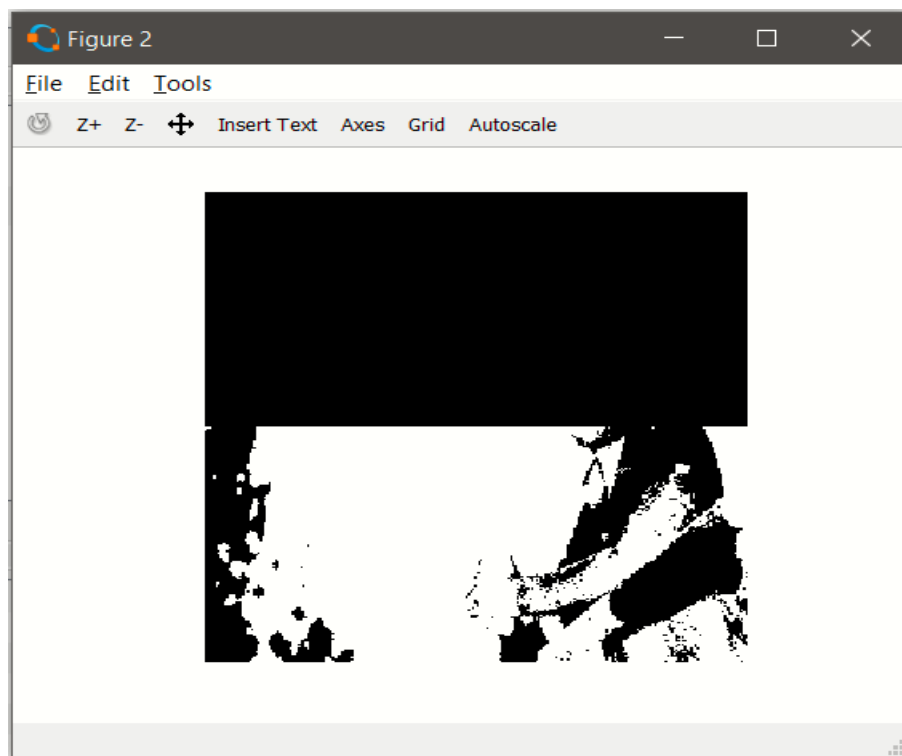
→ **Solution :-**

Code :

```
1  clear
2  clc
3
4  % Read image into a
5  my_img = imread('E:\SEM 7\IP\Sem7 IP\my_img.jpg');
6  a = imread('E:\SEM 7\IP\Lab_2_exercise_images\3.jpg');
7
8  % Resize the image to 256*256.
9  my_img=imresize(my_img,[256,256]);
10 figure
11 imshow(my_img)
12
13 % Logical and
14 b = and(my_img,a);
15 figure
16 imshow(b)
17
18 % Logical or
19 b = or(my_img,a);
20 figure
21 imshow(b)
22
23 % Logical not
24 b = not(my_img);
25 figure
26 imshow(b)
```
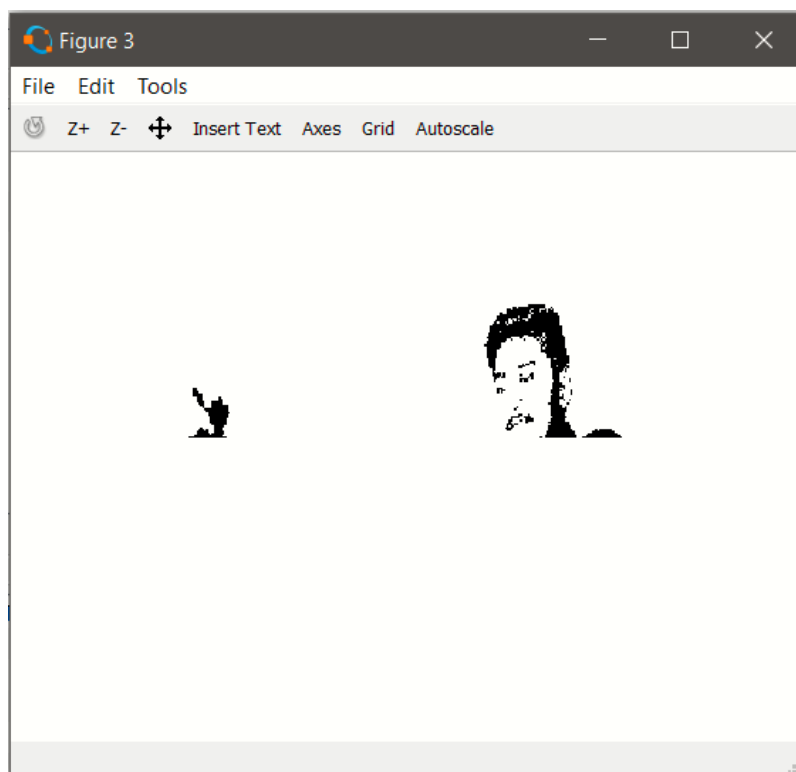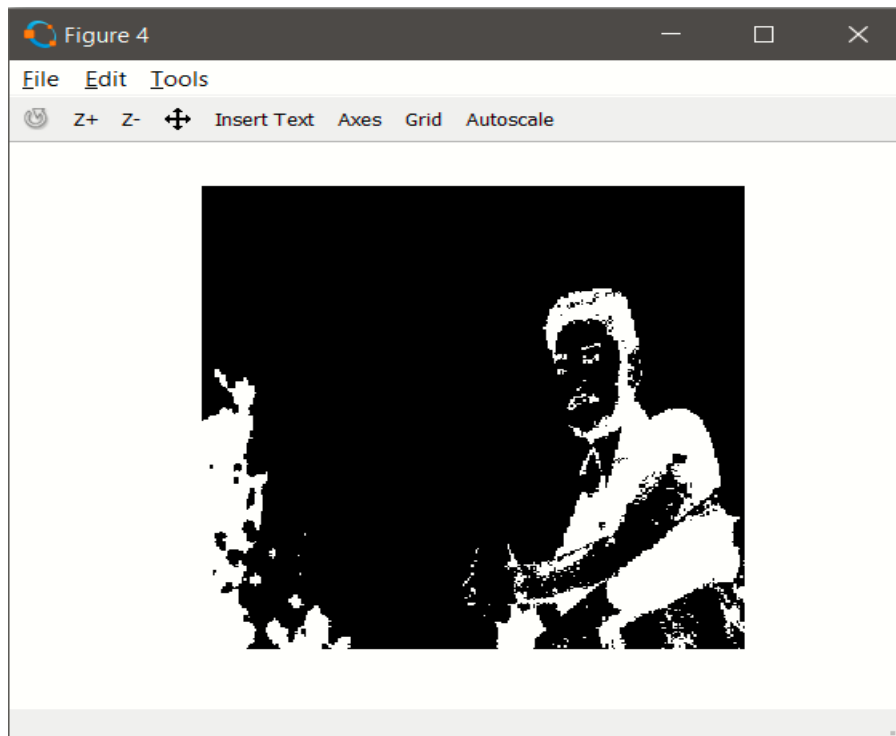
Output Images :

My Image

Logical AND : Logical And with 0 becomes 0 and others remains as it.

Logical OR : Logical Or with 1 becomes 1 and others remains as it.

Logical NOT : Logical Not of 1 becomes 0 and 0 becomes 1.

3. **Consider image 4.jpg, 5.jpg and 6.jpg as input and apply arithmatic operations on input image to generate 7.jpg as output image.**

→ **Solution :-**

Code :

```
1  clear
2  clc
3
4  % Read images
5  original_img = imread('E:\SEM 7\IP\Lab_2_exercise_images\4.jpg');
6  mask = imread('E:\SEM 7\IP\Lab_2_exercise_images\5.jpg');
7  background_img = imread('E:\SEM 7\IP\Lab_2_exercise_images\6.jpg');
8
9  % Resize mask to 357*512
10 mask=imresize(mask,[357,512]);
11
12 original_img = im2double(original_img);
13 mask = im2double(mask);
14 background_img = im2double(background_img);
15
16 a = original_img .* mask;
17
18 neg = 1 - mask;
19 b = background_img .* neg;
20
21 c = a + b;
22 imshow(c);
23
```

Output Image :

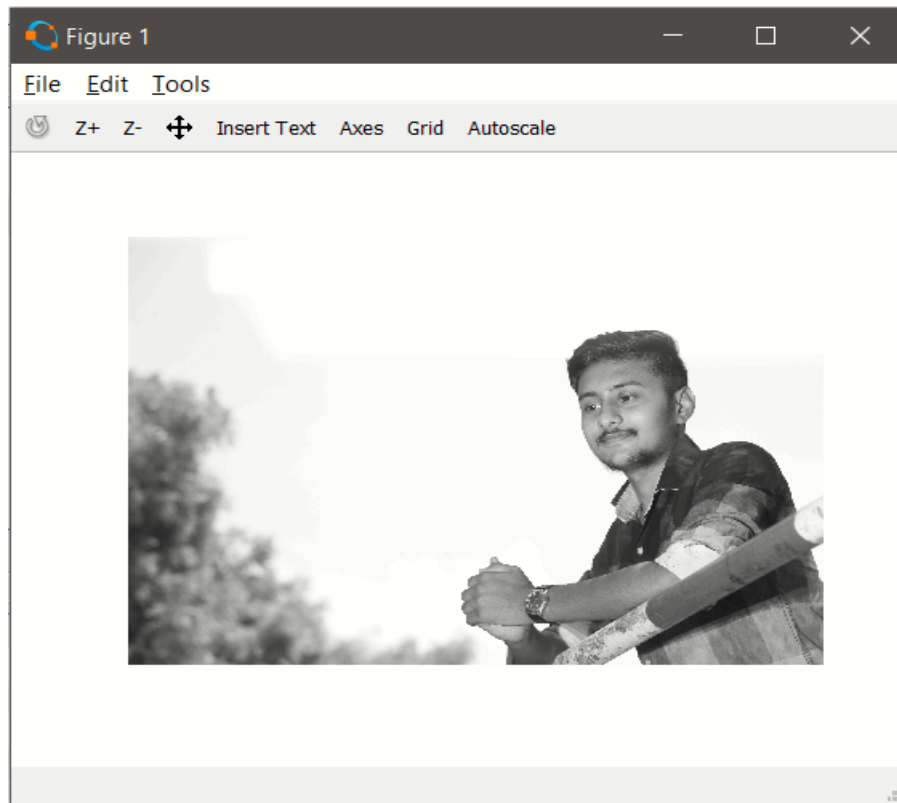## 4. Take your own grayscale photo and apply 'negative' transformation.
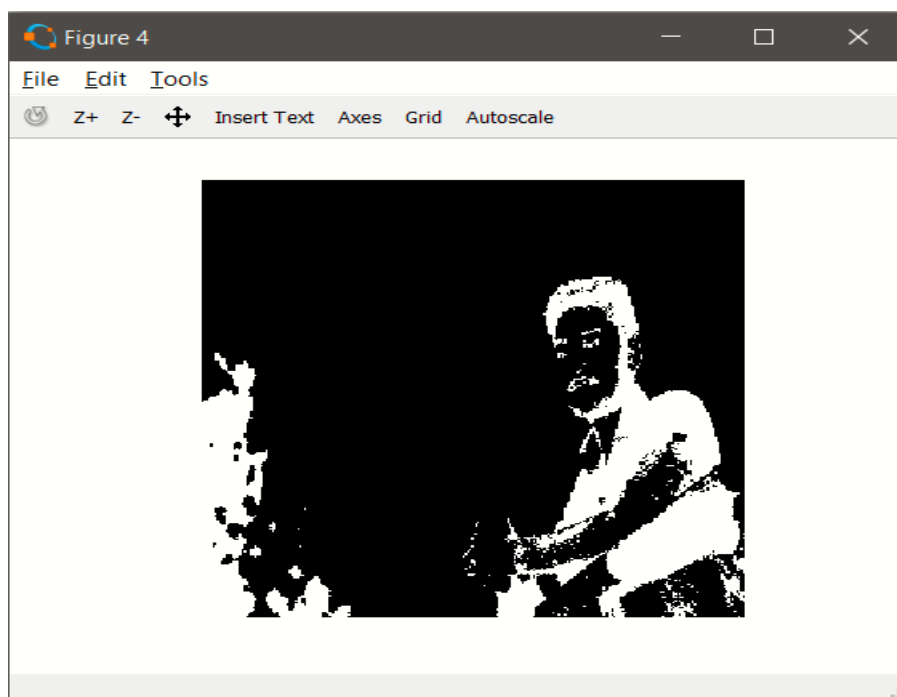
→ **Solution :-**

Code :

```
1  clear
2  clc
3
4  % Read image
5  my_img = imread('E:\CANON PHOTO\21-06\Nihar\IMG_4613.jpg');
6
7  % Gray scale image
8  a = rgb2gray(my_img);
9  figure
10 imshow(a)
11
12 % Negative image
13 a = 255 - a;
14 figure
15 imshow(a)
```
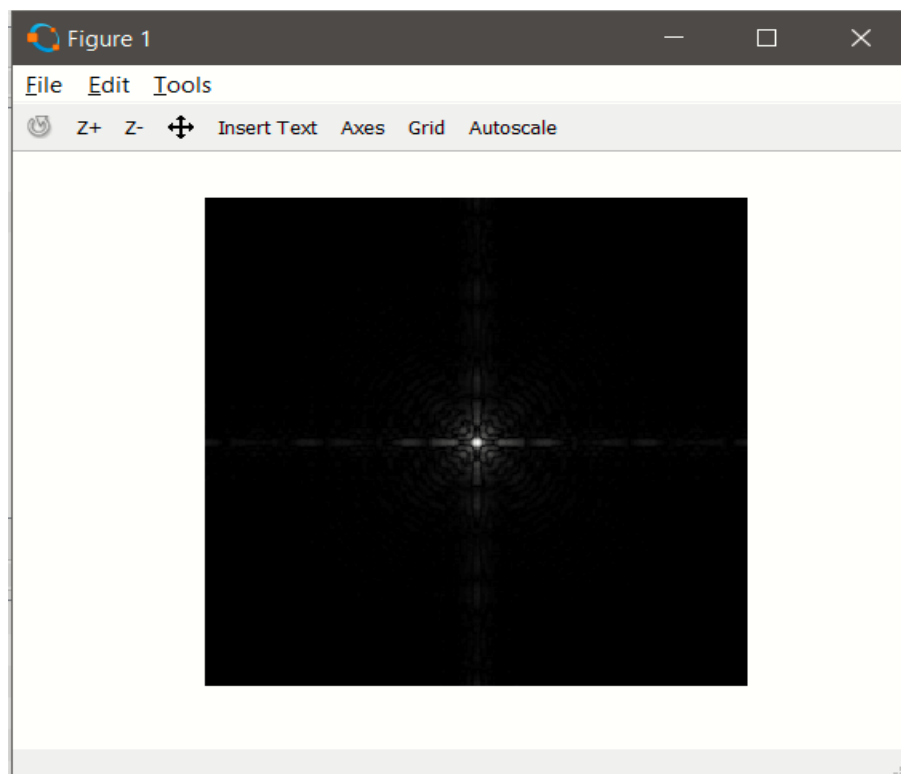
Output Images :

GrayScale Image

Negative Image

5. Consider image 8.jpg. Enhance the image by applying the log transformation.
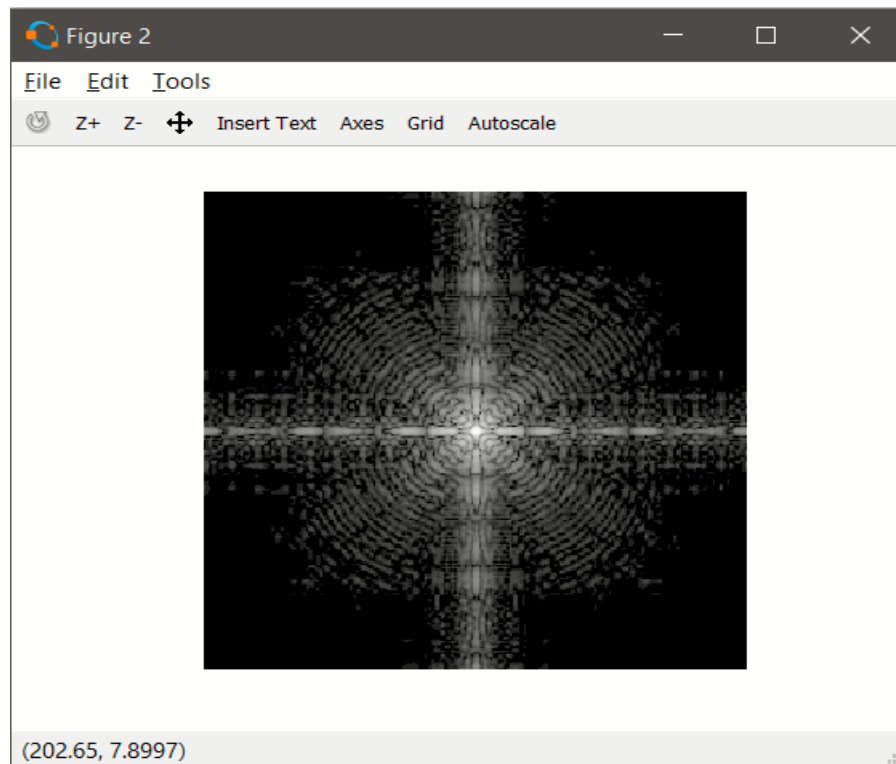
➔ **Solution :-**

Code :

```
1  clear
2  clc
3
4  % Read image
5  r = imread('E:\SEM 7\IP\Lab_2_exercise_images\8.jpg');
6
7  figure
8  imshow(r)
9
10 c = 1;
11 s = c * log(1 + r);
12 figure
13 imshow(s/max(max(s)))
```
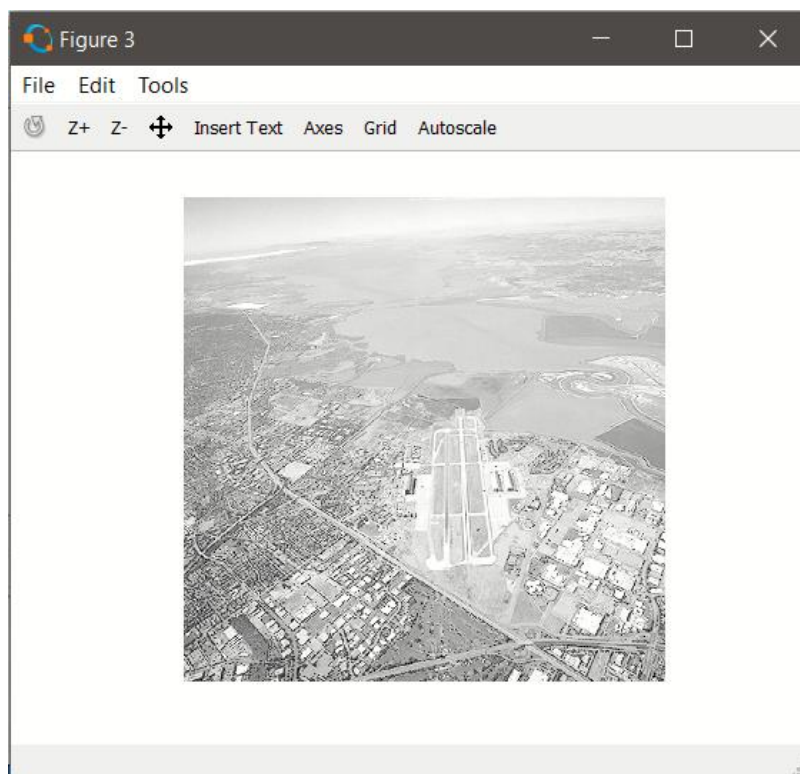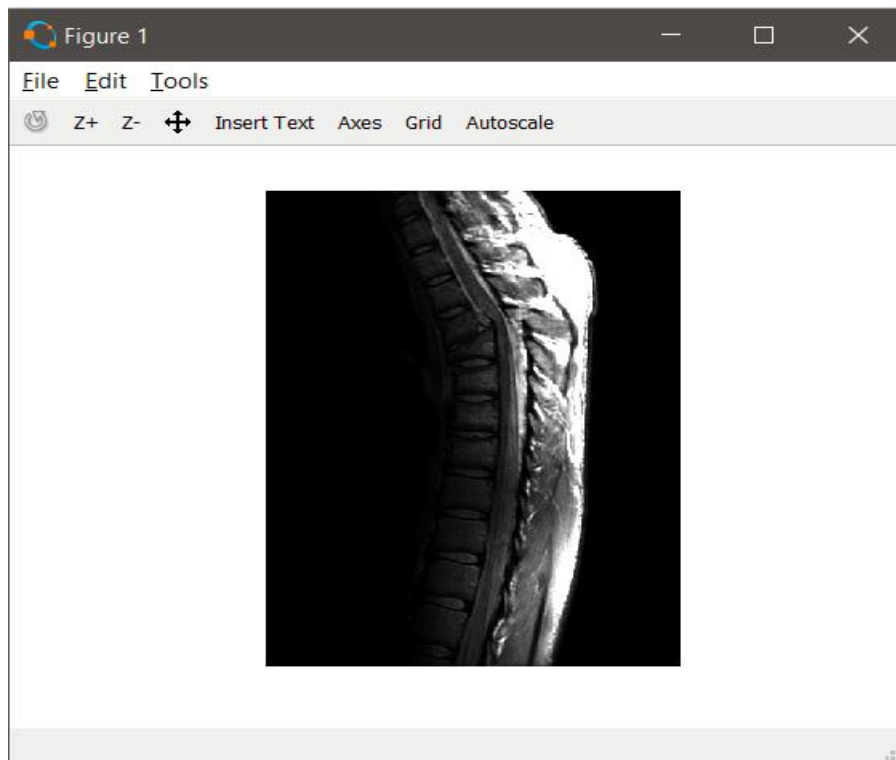
Input Image :

Output Image :

(202.65, 7.8997)

6. **Consider image 9.jpg and 10.jpg and enhance them with power law transformation.**
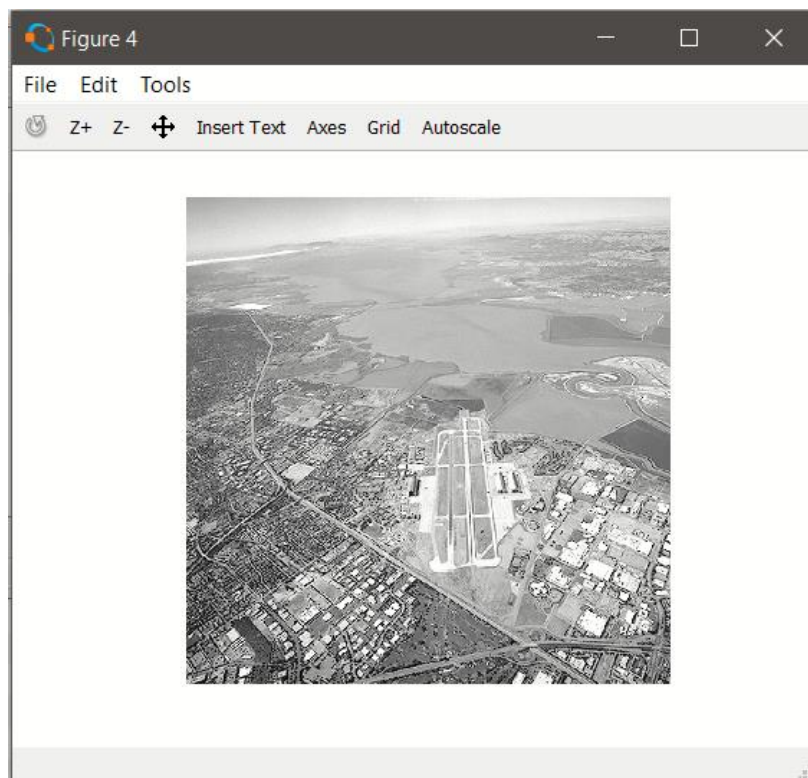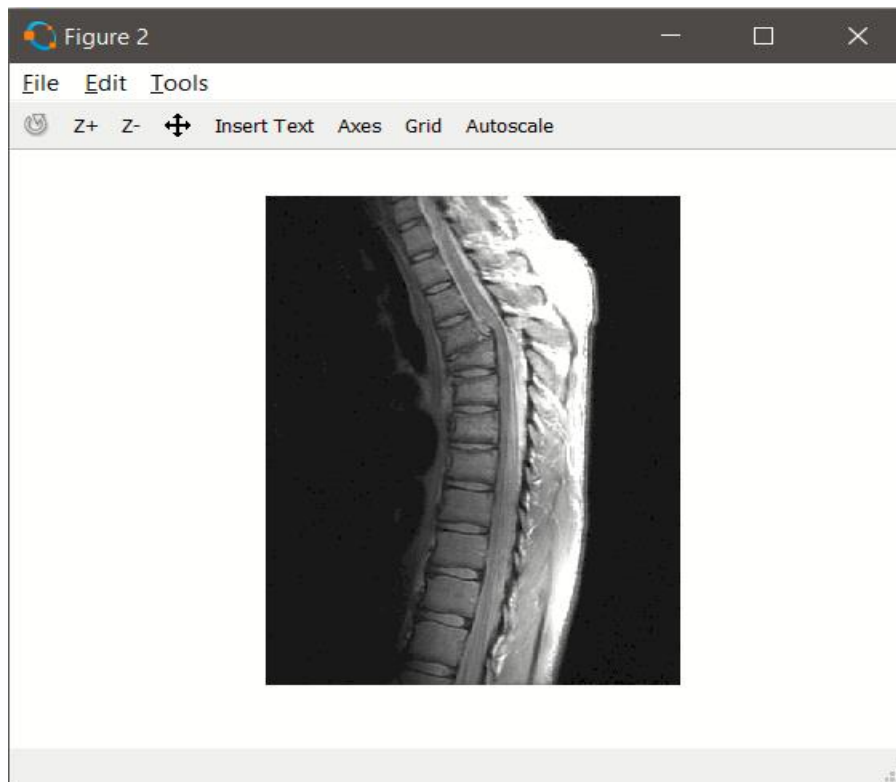
→ **Solution :-**

Code :

```
1   clear
2   clc
3
4   % Read image
5   r1 = imread('E:\SEM 7\IP\Lab_2_exercise_images\9.jpg');
6   r2 = imread('E:\SEM 7\IP\Lab_2_exercise_images\10.jpg');
7   r1 = im2double(r1);
8   r2 = im2double(r2);
9
10  figure
11  imshow(r1)
12
13  c = 1;
14
15  gamma_value = 0.4;
16  s = c * (r1 .** gamma_value);
17  figure
18  imshow(s/max(max(s)))
19
20  figure
21  imshow(r2)
22
23  gamma_value = 1.8;
24  s = c * (r2 .** gamma_value);
25  figure
26  imshow(s/max(max(s)))
```
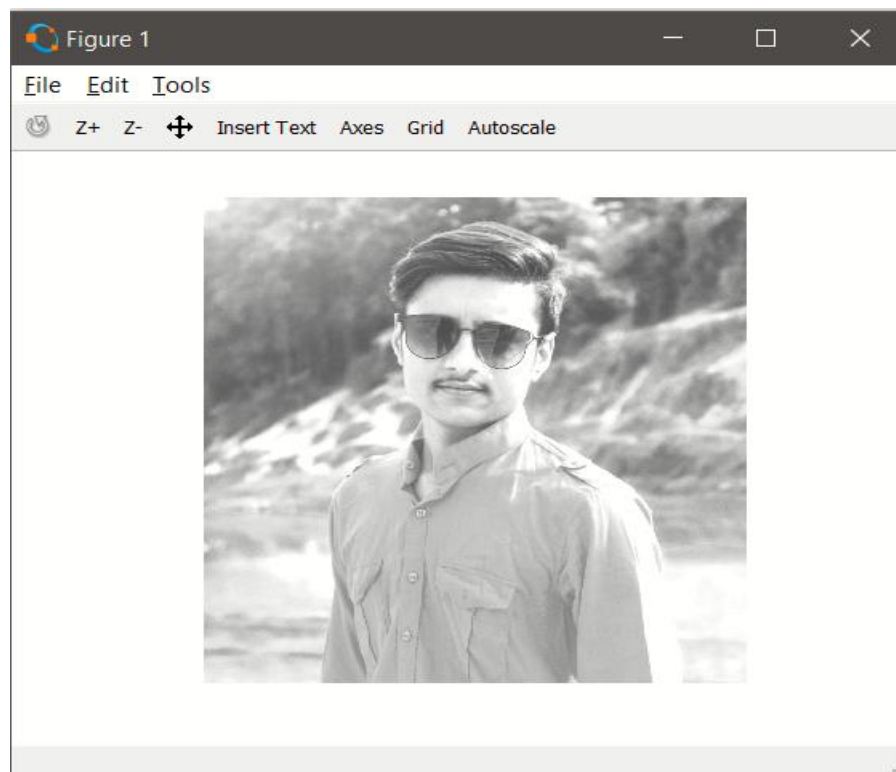
Input Images :

Output Images :

7. **Consider your over exposed photo(that you generated for assignment 1) and enhance it by power law transformation. Specify the value of gamma which is suitable for this enhancement.**

→ **Solution :-**

Code :

```matlab
clear
clc

% Read image into a
a = imread('G:\My Pic\n.jpg');

% Gray scale image
b = rgb2gray(a);

% Over Exposed image
over_exp = b + 80;
over_exp = im2double(over_exp);
figure
imshow(over_exp)

% power law transformation
c = 1;
gamma_value = 2.3;
s = c * (over_exp .** gamma_value);
figure
imshow(s/max(max(s)))
```
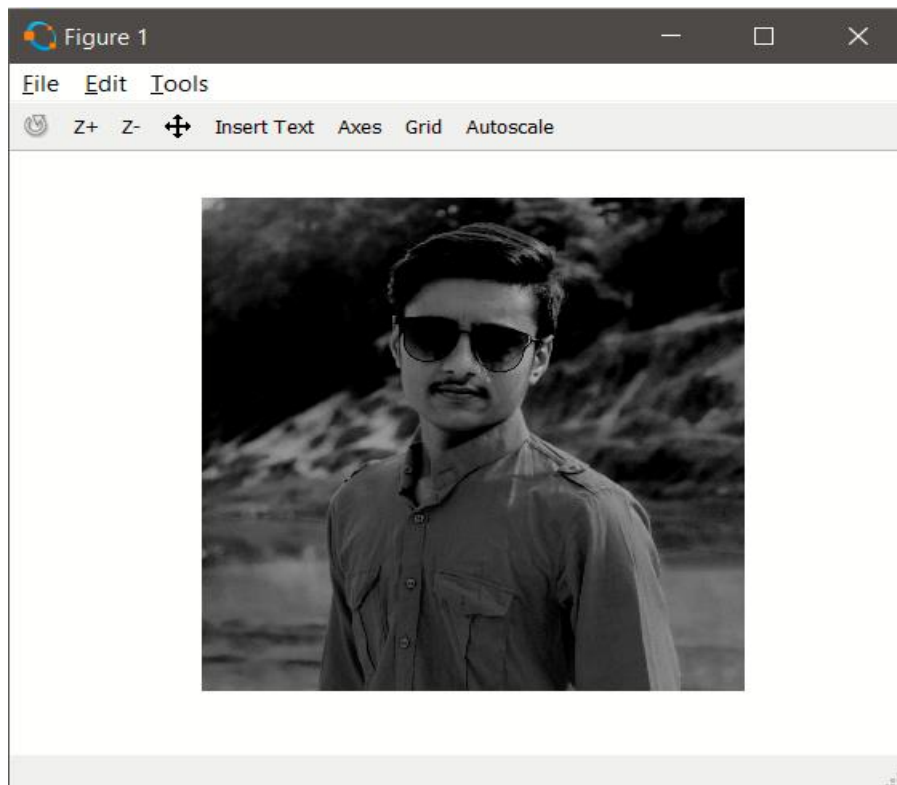
Input Image :

Output Image :

8. **Consider your under exposed photo (that you generated for assignment 1) and enhance it by power law transformation. Specify the value of gamma which is suitable for this enhancement.**

→ **Solution :-**

Code :

```
1   clear
2   clc
3
4   % Read image into a
5   a = imread('G:\My Pic\n.jpg');
6
7   % Gray scale image
8   b = rgb2gray(a);
9
10  % Over Exposed image
11  over_exp = b - 60;
12  over_exp = im2double(over_exp);
13  figure
14  imshow(over_exp)
15
16  % power law transformation
17  c = 1;
18  gamma_value = 0.6;
19  s = c * (over_exp .** gamma_value);
20  figure
21  imshow(s/max(max(s)))
```

Input Image :

Output Image :