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.**
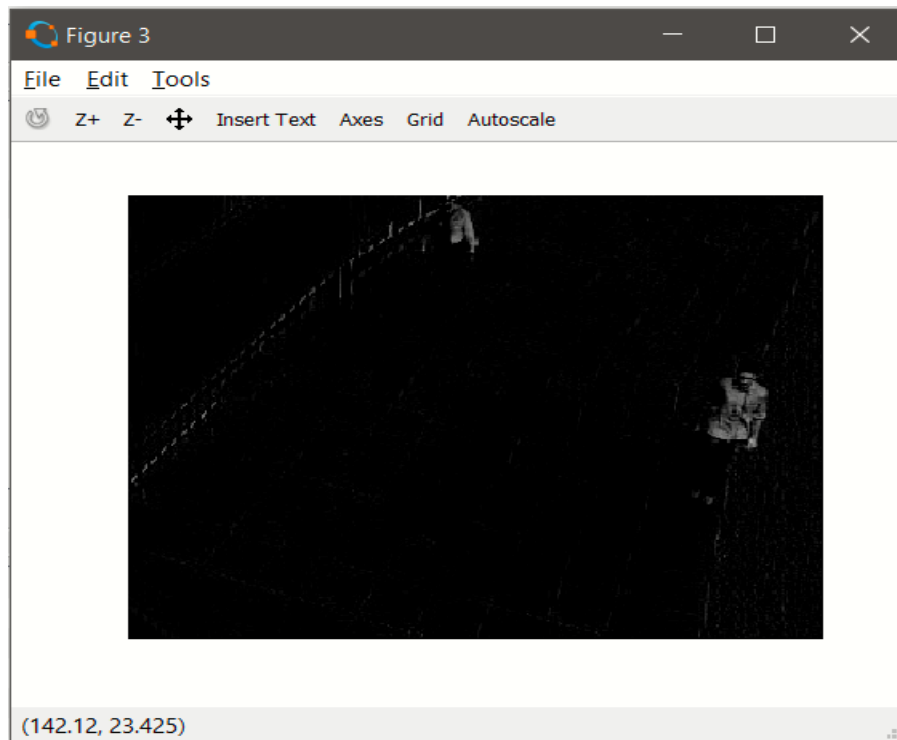
→ **Solution :-**

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)
```
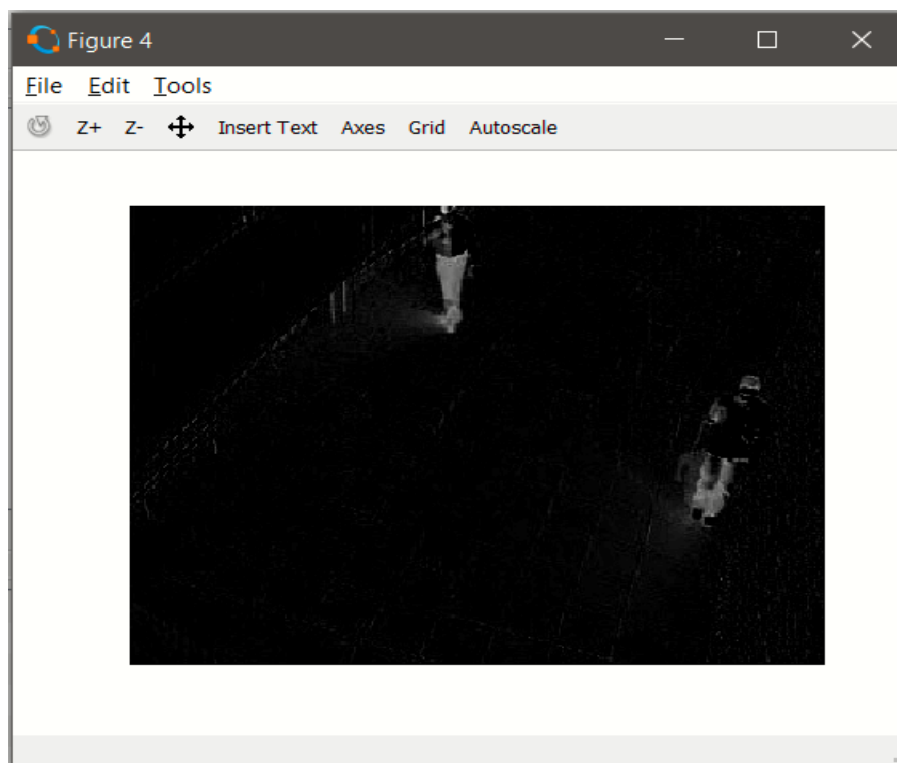
Input Images :
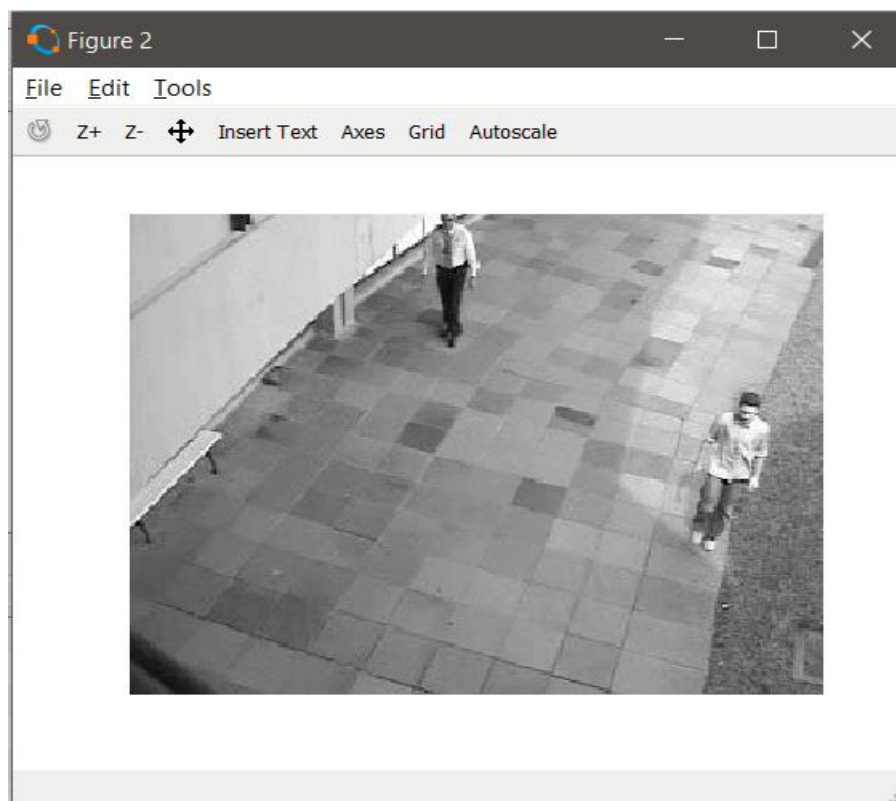
Output Images :

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)
```
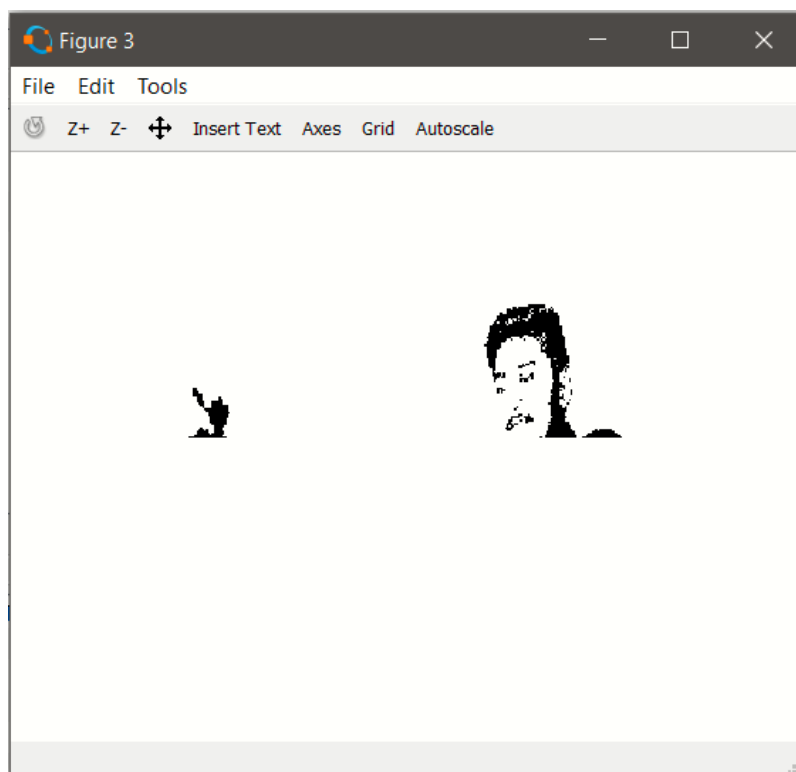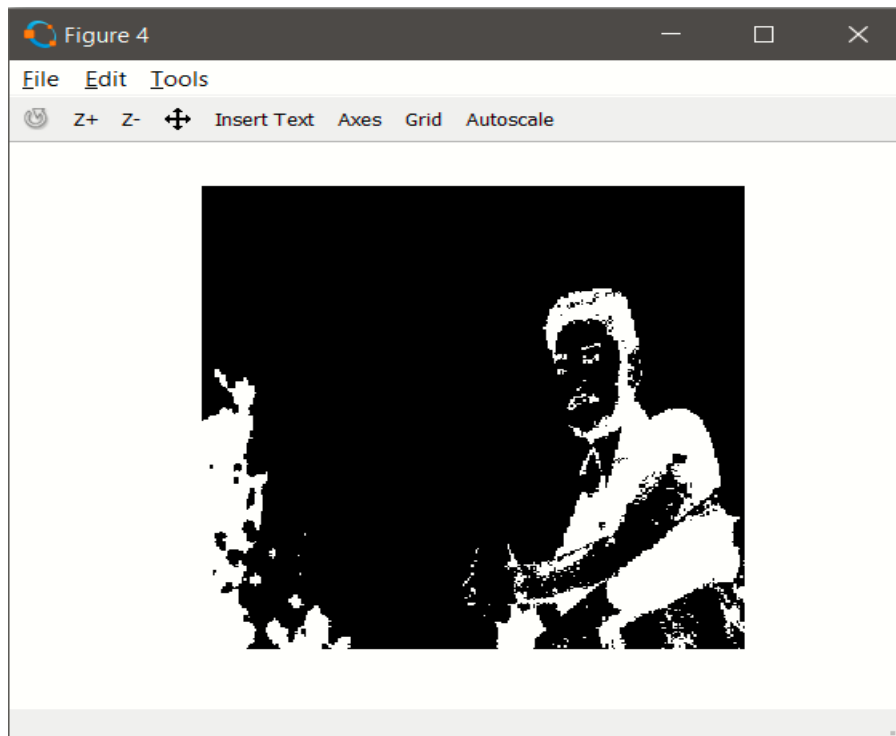
Output Images :

My Image

Logical AND : Logical And with 0 becomes 0 and others remains as it.
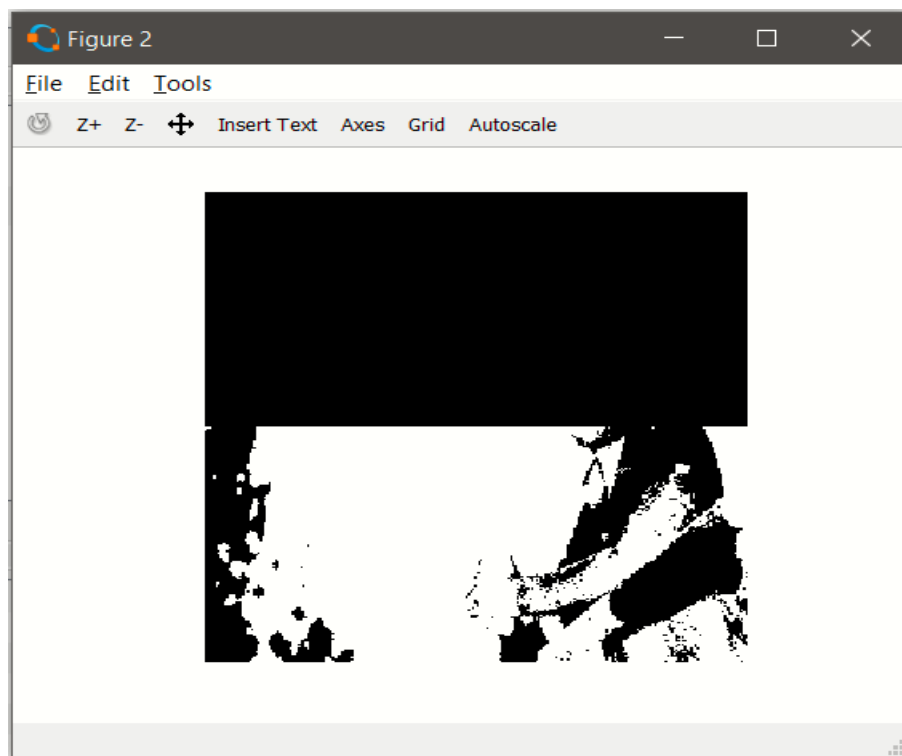
Logical OR : Logical Or with 1 becomes 1 and others remains as it.

Logical NOT : Logical Not of 1 becomes 0 and of 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.
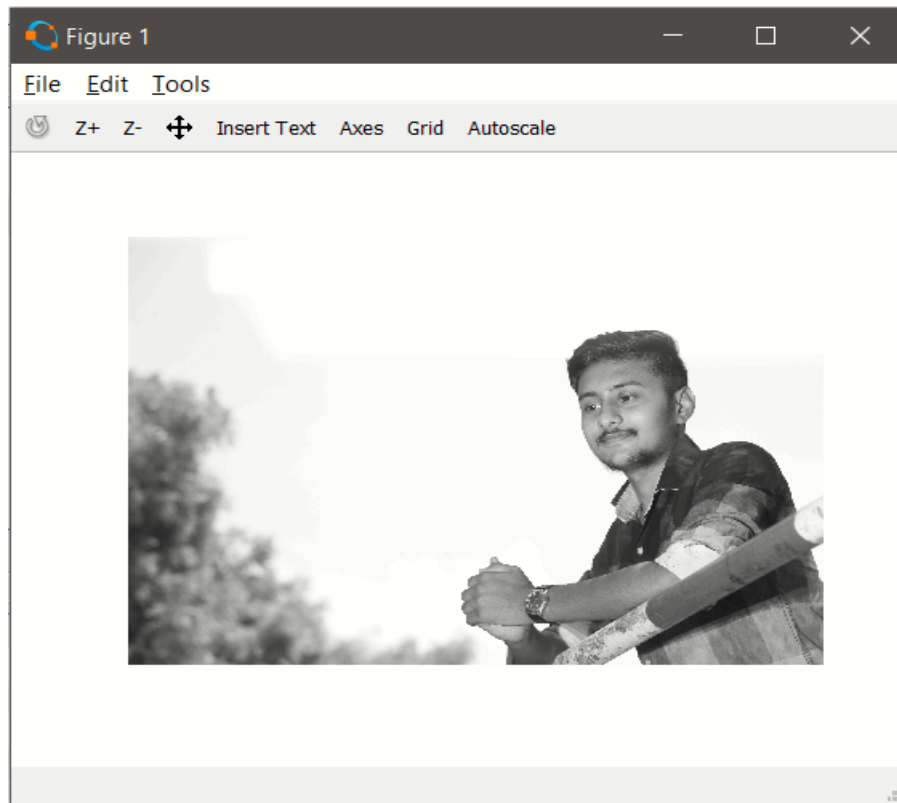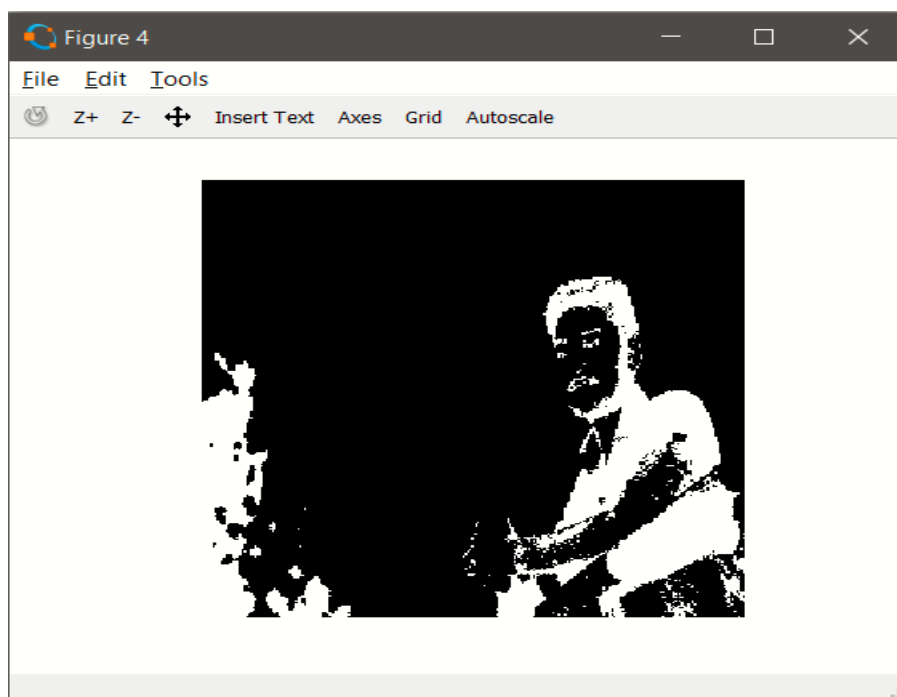
→ **Solution :-**

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
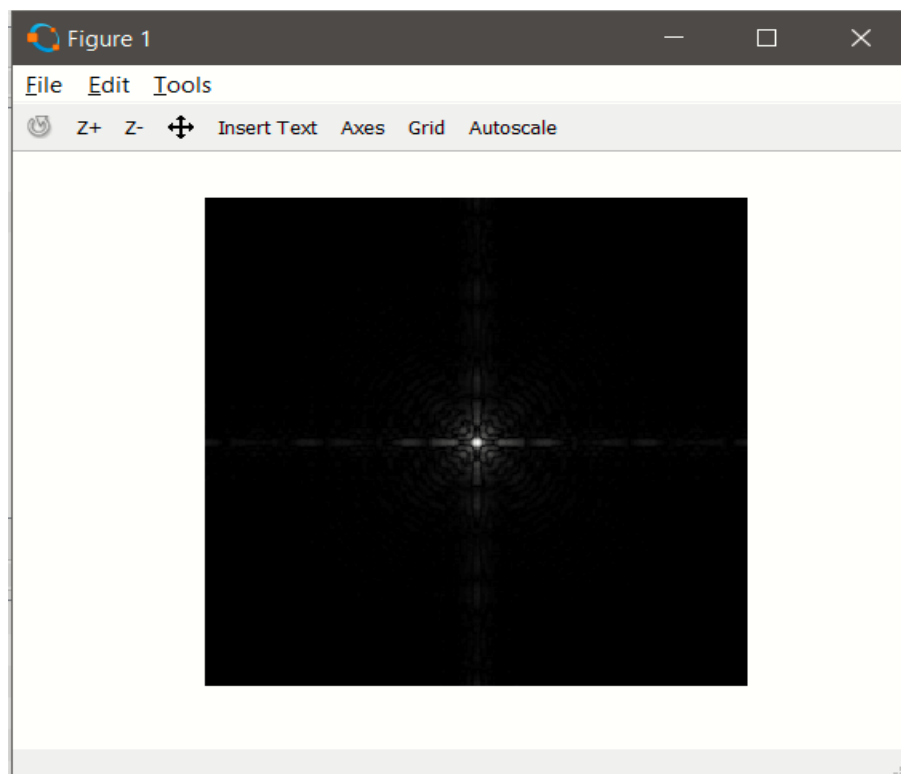

Negative Image

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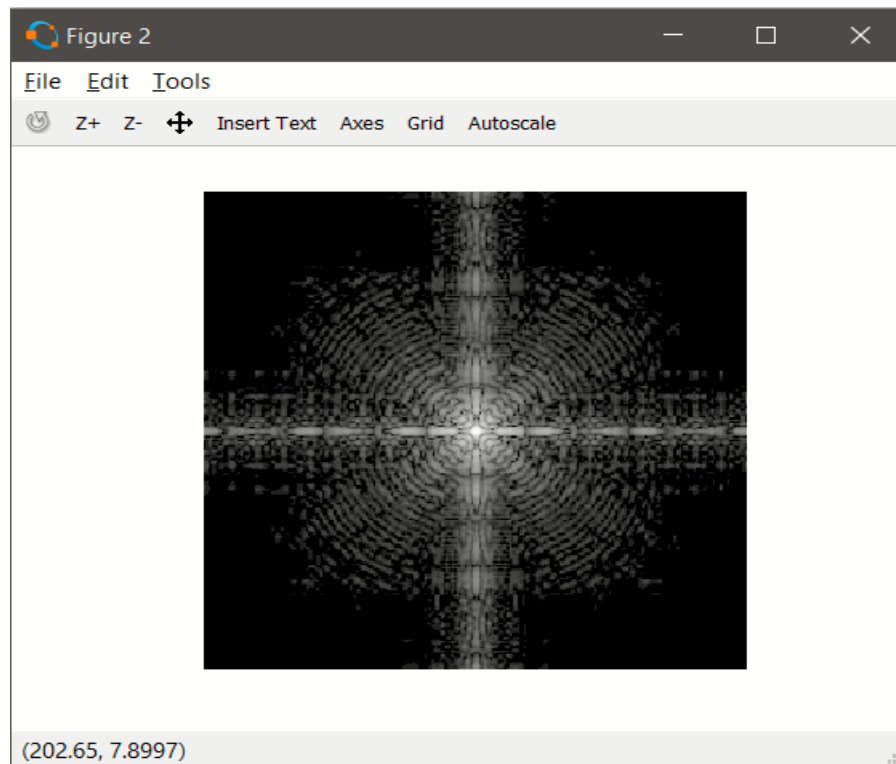
→ **Solution :-**

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)))
```
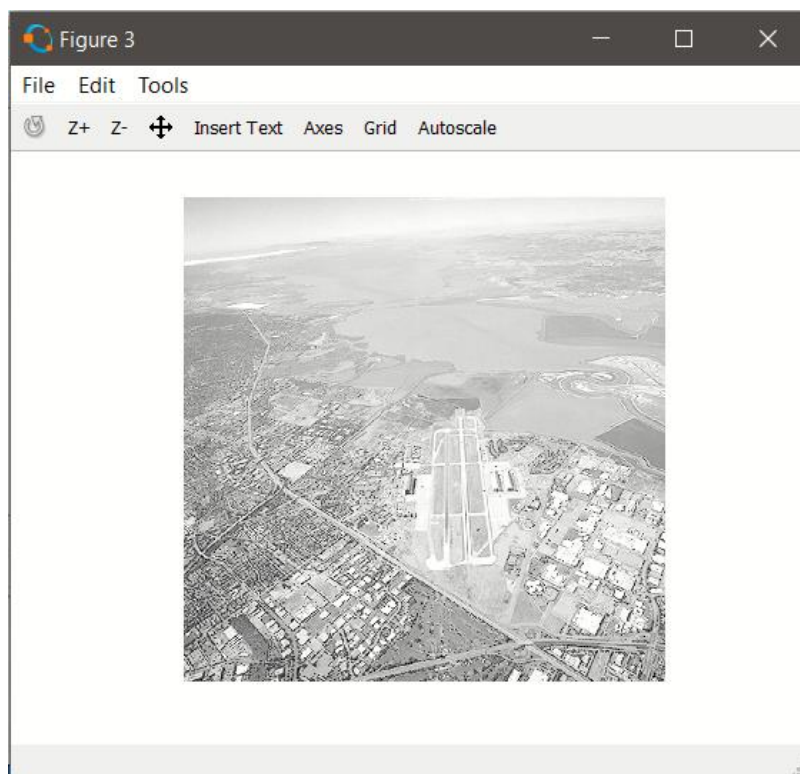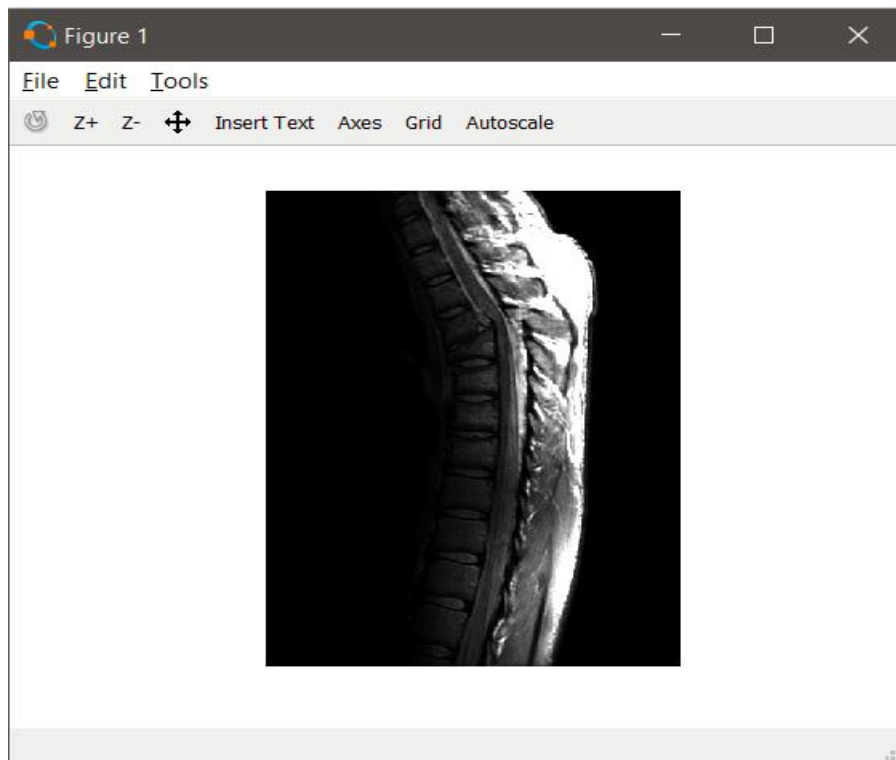
Input Image :

Output Image :

(202.65, 7.8997)

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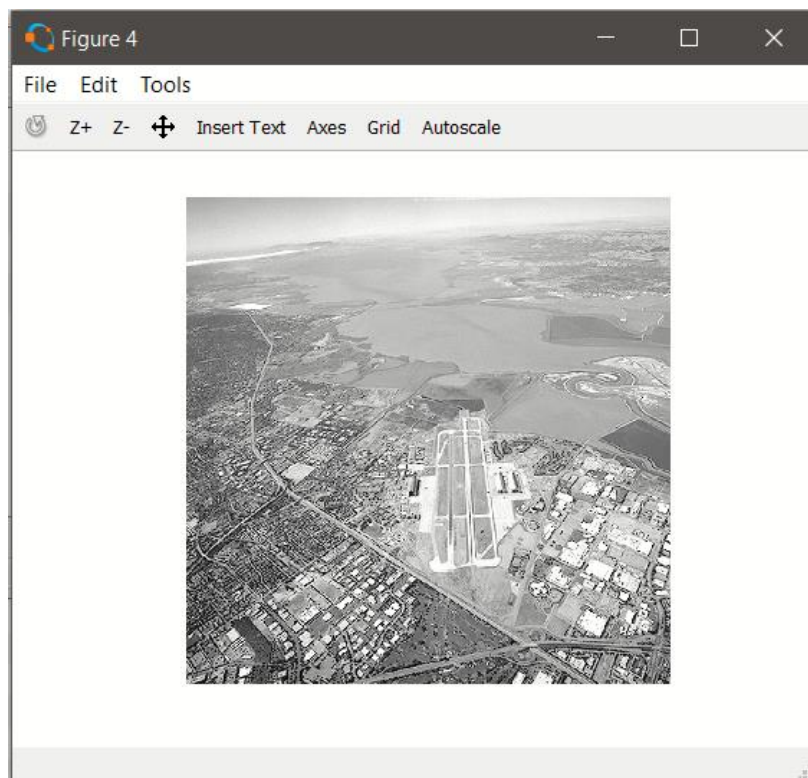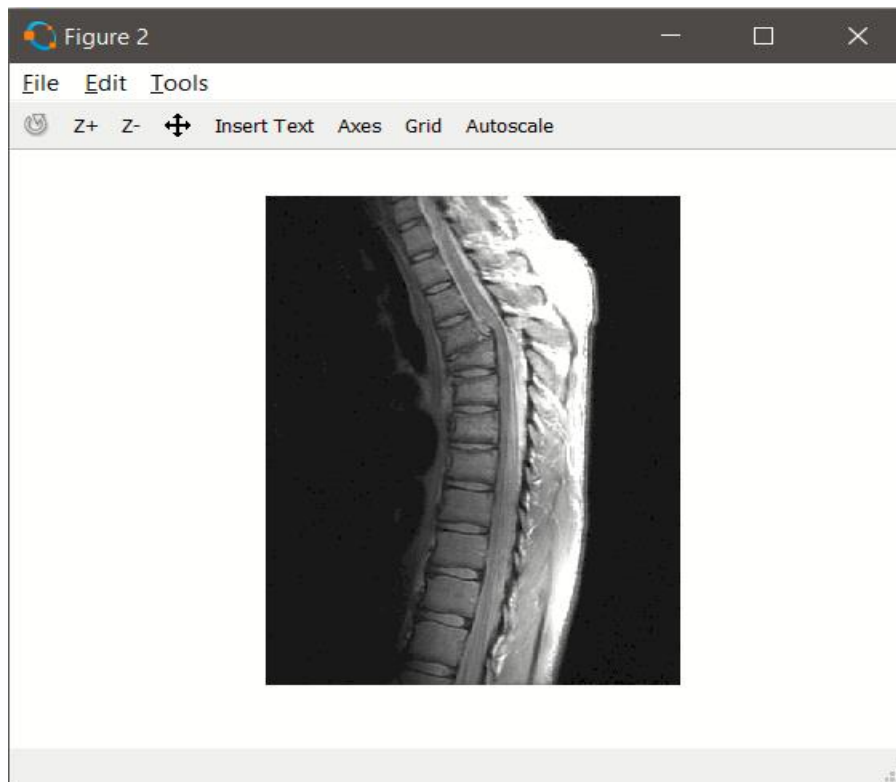
→ **Solution :-**

Code :

```matlab
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)))
```
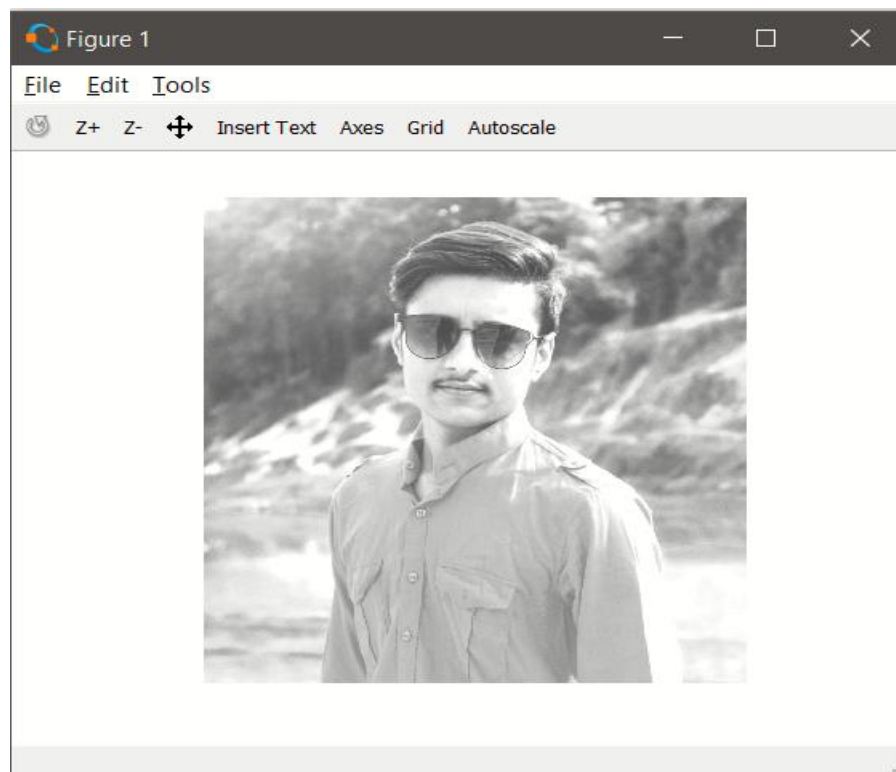
Input Images :

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 :

```
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 + 80;
12 over_exp = im2double(over_exp);
13 figure
14 imshow(over_exp)
15
16 % power law transformation
17 c = 1;
18 gamma_value = 2.3;
19 s = c * (over_exp .** gamma_value);
20 figure
21 imshow(s/max(max(s)))
```
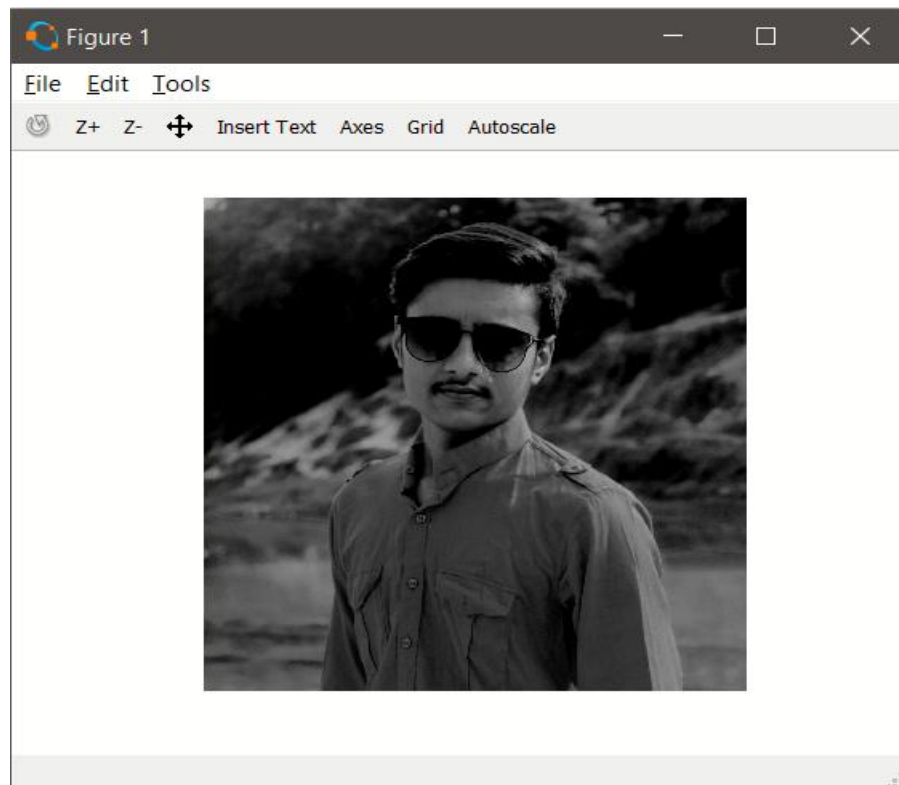
Input Image :

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 :