

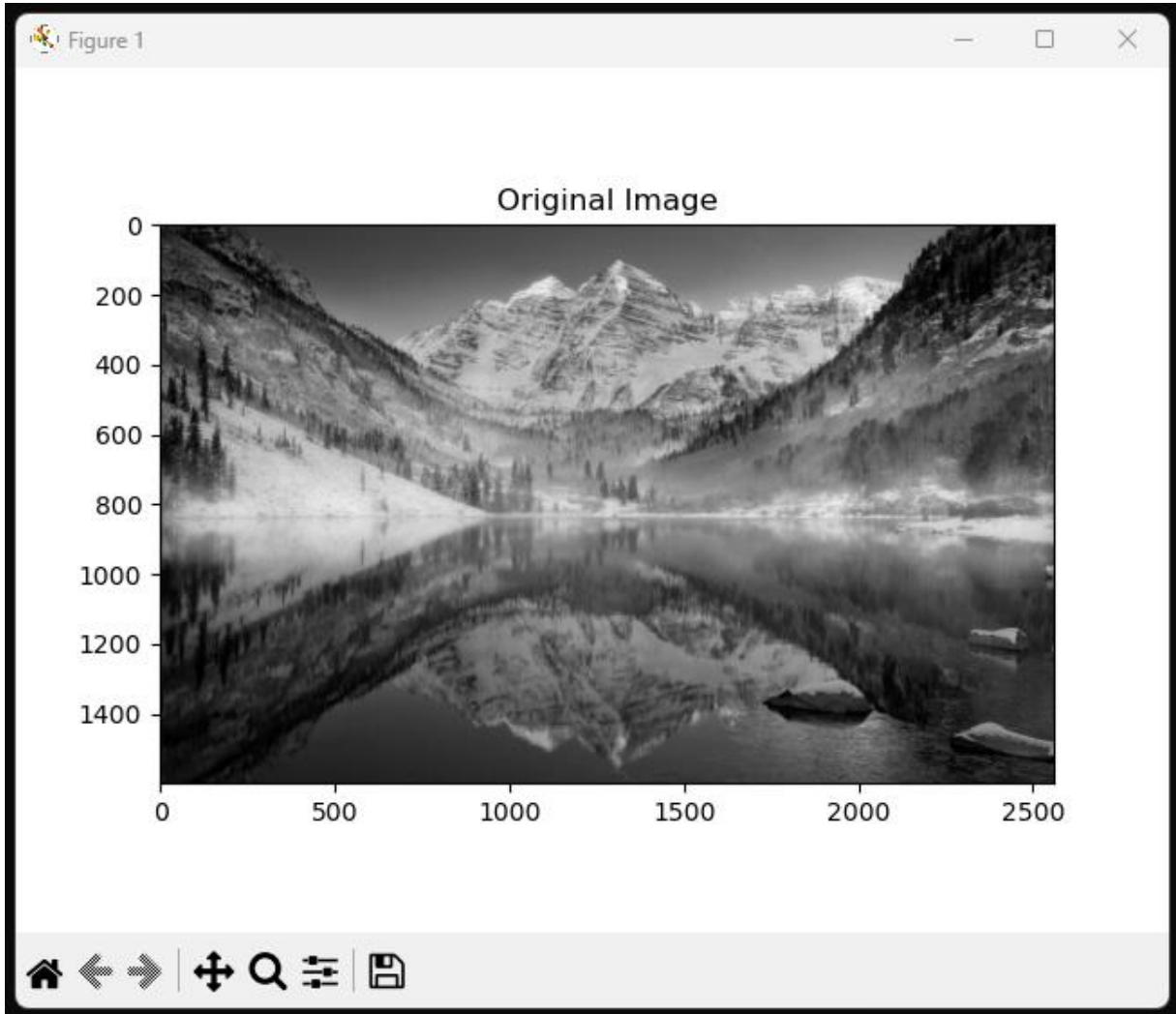
ASSIGNMENT 05

PROBLEM #01 SVD SOLUTION OUTPUT

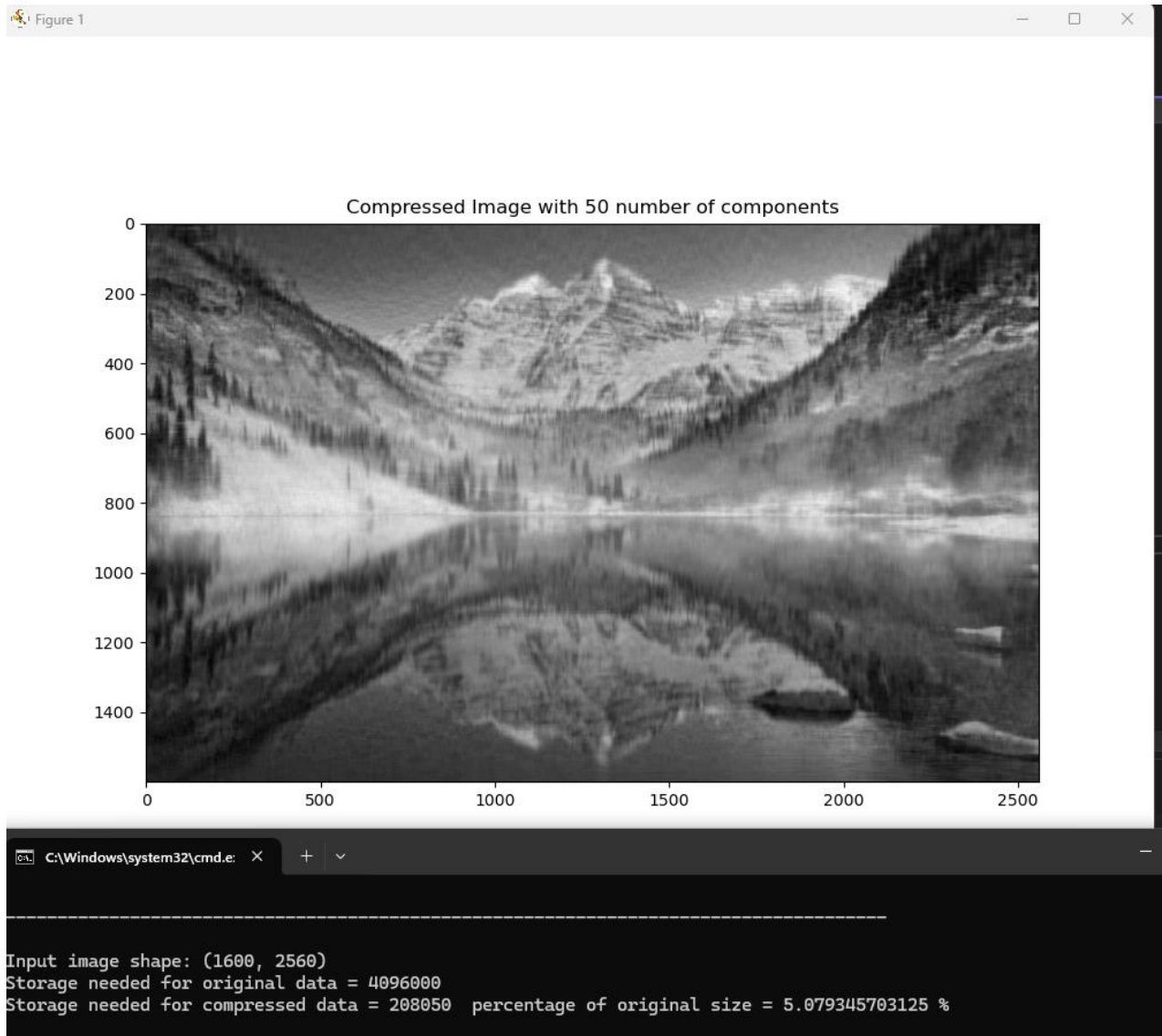
```
Eigenvectors:
[[ 0.70710678 -0.70710678]
 [ 0.70710678  0.70710678]]
----u----
[[-0.70710678 -0.70710678]
 [-0.70710678  0.70710678]]
----s----
[[4. 0.]
 [0. 2.]]
----v----
[[-0.70710678 -0.70710678]
 [-0.70710678  0.70710678]]
----A from SVD components-----
[[3. 1.]
 [1. 3.]]
-----second example - SVD of 2x3 matrix
----u----
[[-0.70710678 -0.70710678]
 [-0.70710678  0.70710678]]
----s----
[[5. 0. 0.]
 [0. 3. 0.]]
----v----
[[-7.07106781e-01 -7.07106781e-01 -6.47932334e-17]
 [-2.35702260e-01  2.35702260e-01 -9.42809042e-01]
 [-6.66666667e-01  6.66666667e-01  3.33333333e-01]]
----A from SVD components-----
[[ 3.  2.  2.]
 [ 2.  3. -2.]]
Press any key to continue . . .
```

PROBLEM #02 SVD IMAGE SOLUTION OUTPUT

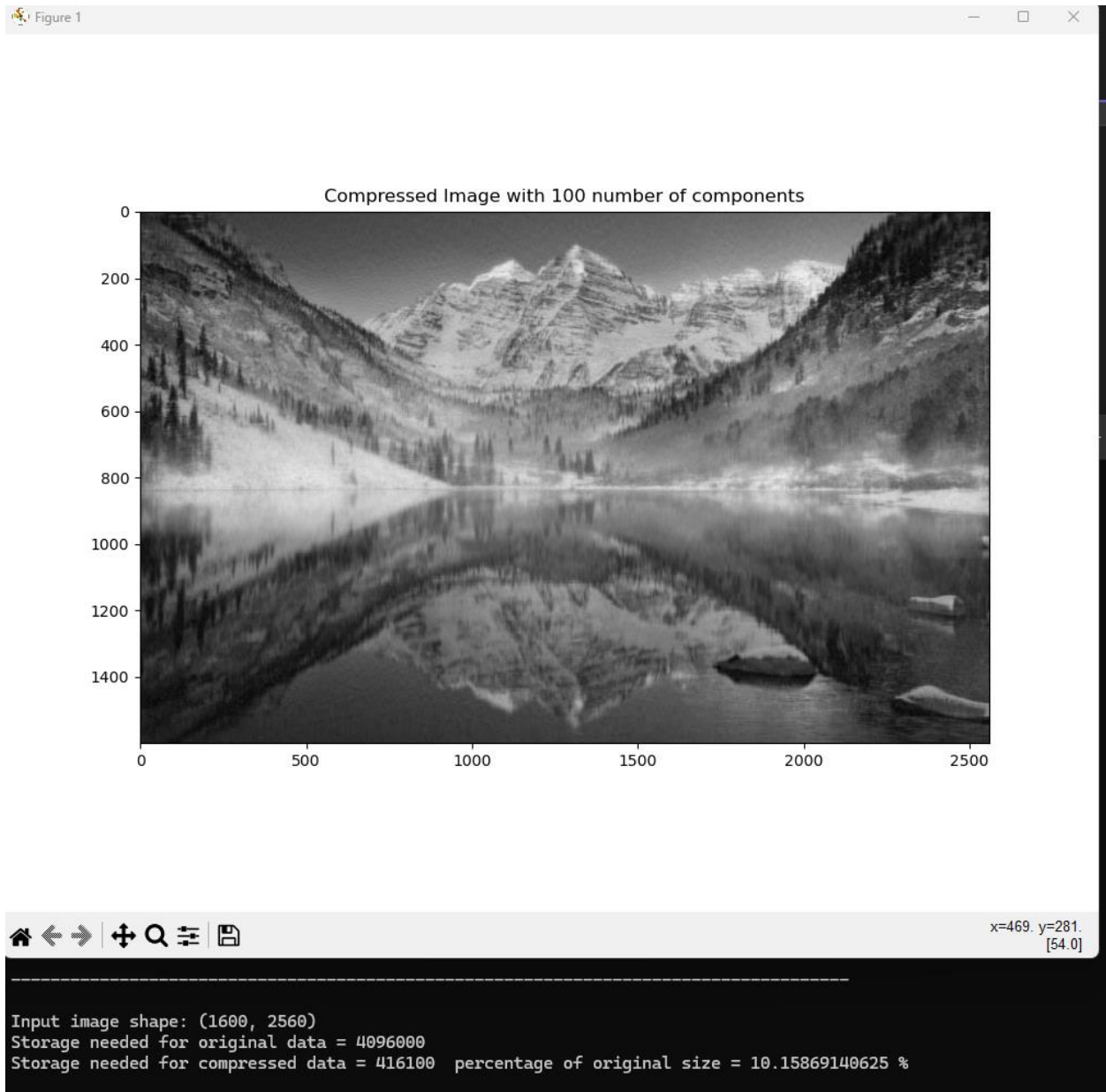
Original Image



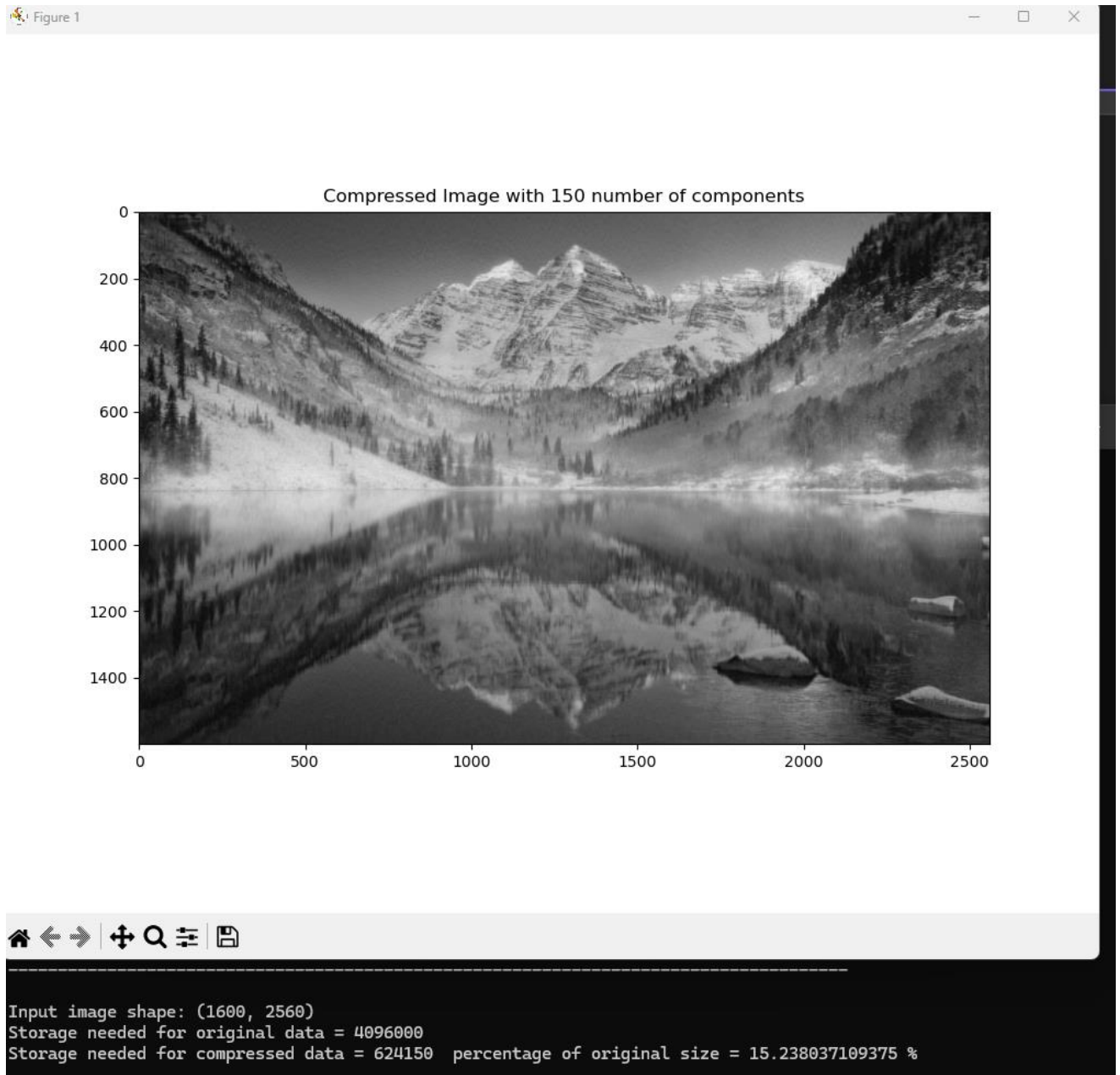
N = 50



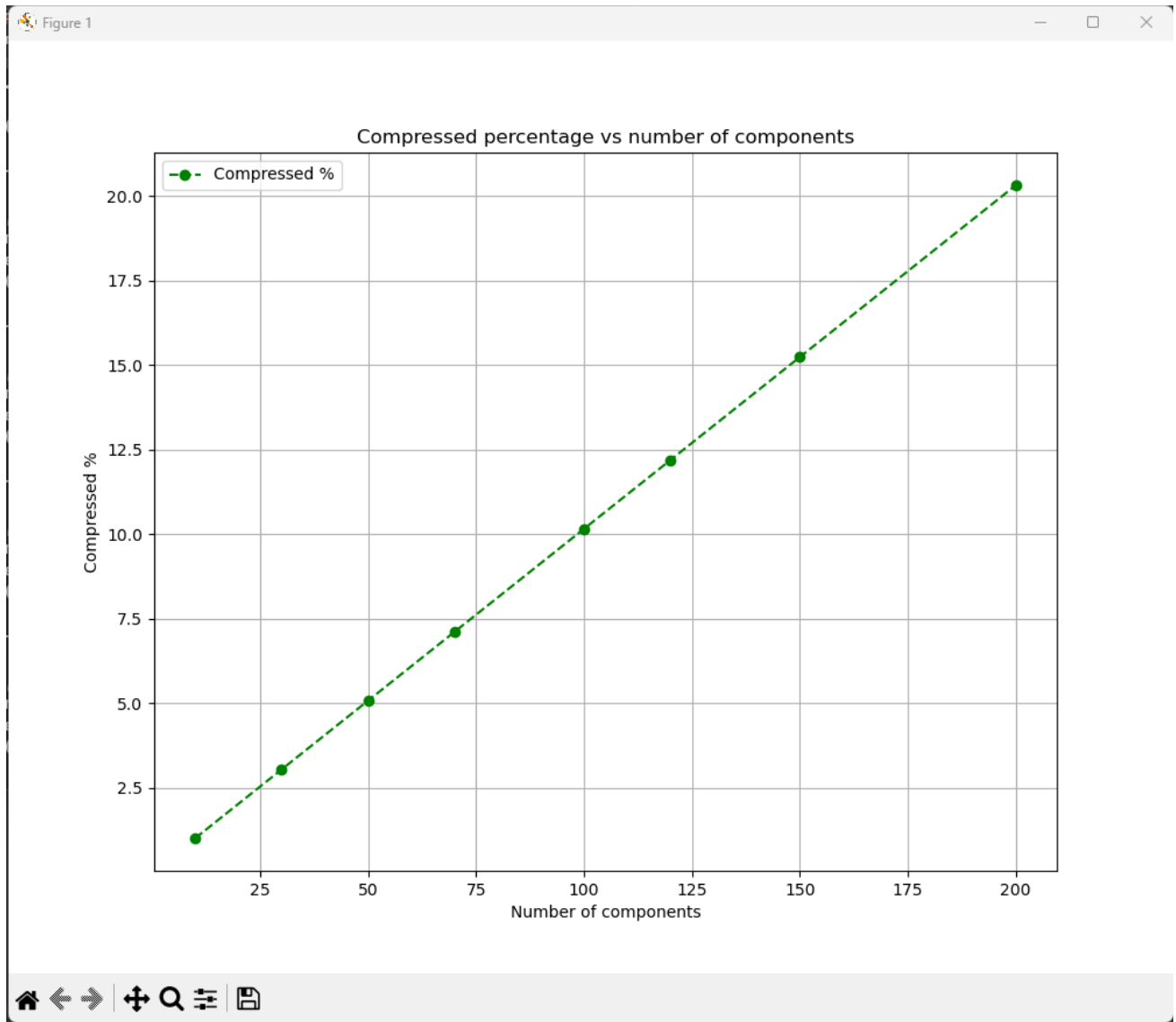
N=100



N=150



Effect of number of components over compressed percentage



Other outputs

```
-----  
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 208050   percentage of original size = 5.079345703125 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 41610   percentage of original size = 1.015869140625 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 124830   percentage of original size = 3.047607421875 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 208050   percentage of original size = 5.079345703125 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 291270   percentage of original size = 7.111083984375 %  
Compressed image shape: (1600, 2560)  
-----
```

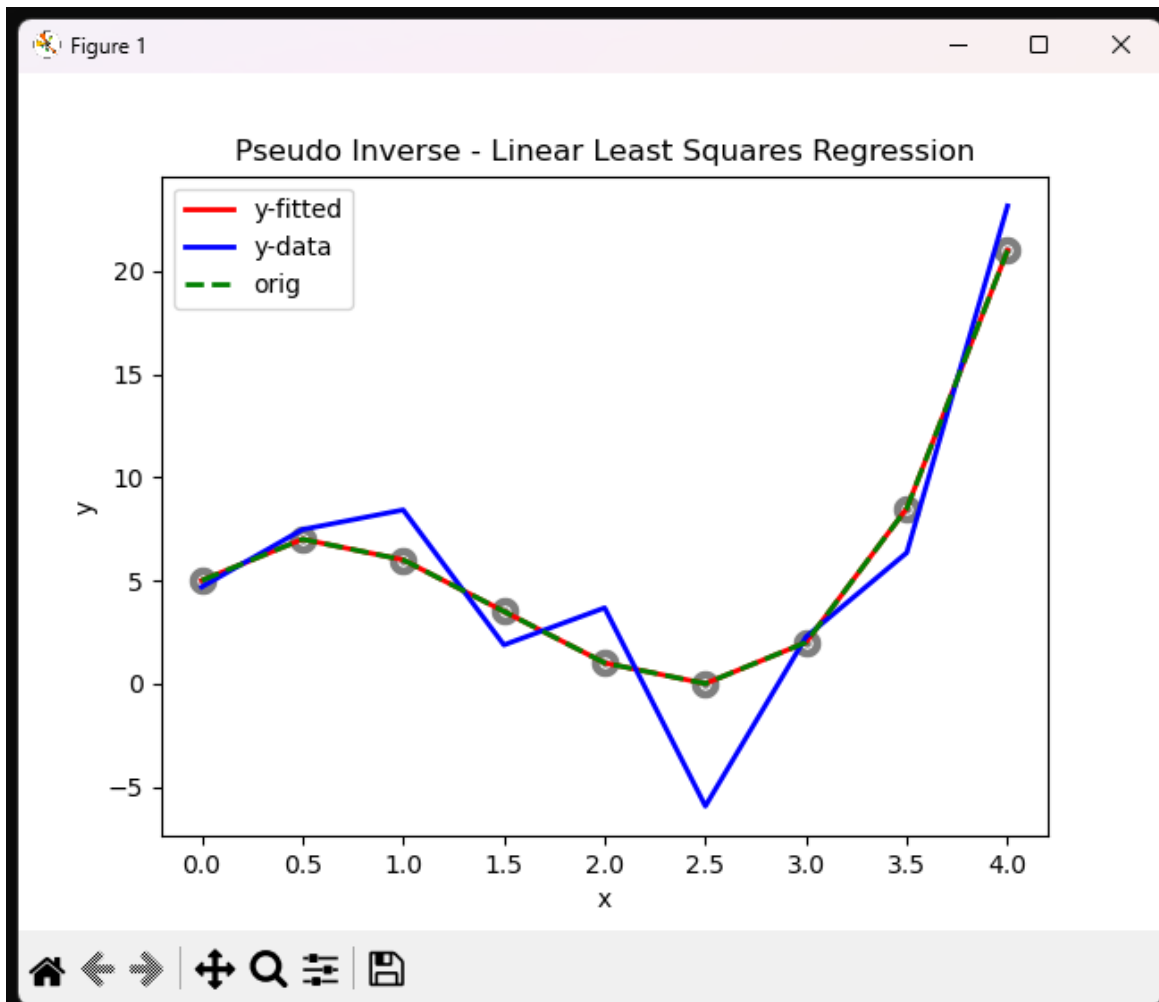
```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 416100   percentage of original size = 10.15869140625 %  
Compressed image shape: (1600, 2560)  
-----
```

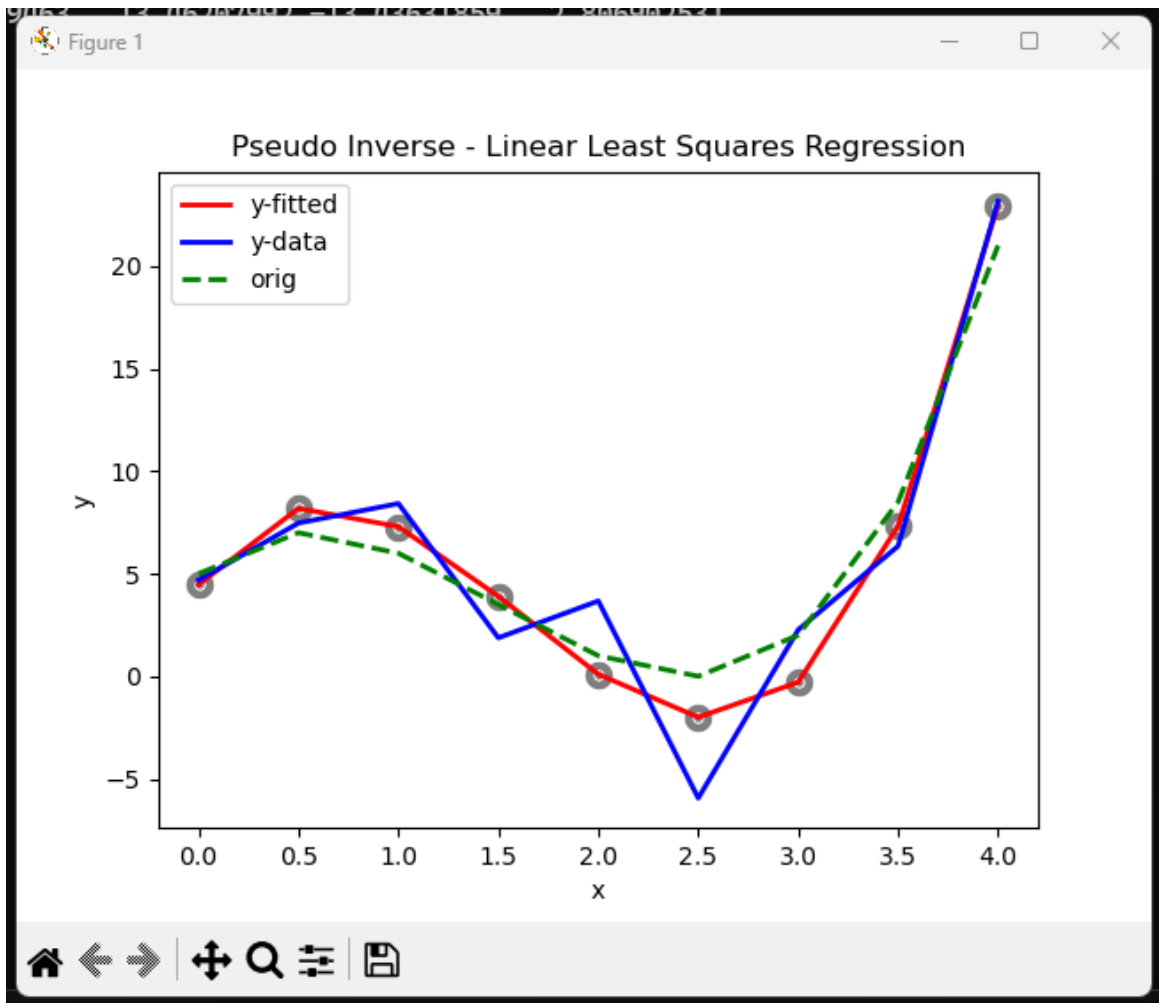
```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 499320   percentage of original size = 12.1904296875 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 624150   percentage of original size = 15.238037109375 %  
Compressed image shape: (1600, 2560)  
-----
```

```
Input image shape: (1600, 2560)  
Storage needed for original data = 4096000  
Storage needed for compressed data = 832200   percentage of original size = 20.3173828125 %  
Compressed image shape: (1600, 2560)  
-----
```

PROBLEM #03 PSEUDOINVERSE SOLUTION OUTPUT





```
C:\Windows\system32\cmd.e: X + v
-----beta_coeffs-----
[ 4.4639463 13.46207992 -13.43631859 2.80690253]
Press any key to continue . . .
```