[N.B.: Use Comments in python code as much as possible]

Task 01 - Python Basics

1. Take three float values in three variables by user input and find out the sum of three values.
2. Take three lists, print them and find out the sum of three lists.
3. Print the sum of first 100 numbers using for loop, while loop and do while loop.
4. Print the Fibonacci series using for loop.
5. Take three strings as user input, print them and concatenate them.
6. Perform String Slicing operation: Slice From the Start, Slice To the End and slicing using Negative Indexing.
7. Determine the grade of a student using if..else logic if subject number is taken as user input.
8. Determine the grade of a student using switch..case logic if subject number is taken as user input.
9. Take four NumPy arrays (nparray1, nparray2, nparray3, nparray4). Define nparray1=[[1,2,3,4], [5,6,7,8]]), nparray2 = [5,6,7,8], nparray3 as zeros of dimension (3,4) and nparray4 as ones of dimension (3,7). Now perform NumPy array slicing: selecting 1st 2 rows and 1st two columns, first element, middle element and last element individually.

Task 02 – Basic Image Pixel Operations

10. Take a 5x6 NumPy array and flip the 5x6 NumPy array.
11. Take a grayscale image and generate the mirror image of the original image. Show input and output image side by side in a subplot with a title.
12. Take a grayscale image and generate the flipped image of the original image. Show input and output image side by side in a subplot with a title.
13. Take an 8-bit grayscale image and apply Thresholding such that the pixel having intensity values below 150 will be replaced by 0 and pixels having intensity value equal or above 150 will be replaced by 255. Display input and output image side by side in a subplot with a title.
14. Take an 8-bit grayscale image and apply Thresholding such that the pixel having intensity values below 50 will be replaced by 0 and pixels having intensity value above 150 will be replaced by 255. Display input and output image side by side in a subplot with a title.

Task 03 – Grayscale Image Transformation

15. Take a 5x6 NumPy array and apply negative image operations (calculate image bit dynamically). Convert the input and output NumPy array into an image and show them side by side in a subplot with a title.
16. Take a grayscale image and apply negative image operations (calculate image bit dynamically). Show input and output image side by side in a subplot with a title. Use PyPlot to plot the negative transformation curve (r on the x-axis and s on the y-axis).
17. Take a grayscale image and apply log transformation image operations (C = 1 and C = L/ ($\log_{10}(1+r)$)). Show input and output image side by side in a subplot with title. Use PyPlot to plot log transformation curve (r in x-axis and s in y-axis).
18. Take a grayscale image and apply gamma transformation image operations ($\gamma = 0.2$, $\gamma = 0.4$, $\gamma = 0.6$, $\gamma = 1.0$, $\gamma = 1.5$, $\gamma = 2.5$, $\gamma = 5.0$). Show input and output image side by side in a subplot with a title. Use PyPlot to plot the gamma transformation curve for each γ value individually (r on the x-axis and s on the y-axis).

Task 04 – Image Histogram

19. Take a 5x6 NumPy array and plot the histogram of the array with proper labels (with and without built in histogram function). Show both histograms side by side in a subplot with a title. Show both input and output NumPy array into an image and show them side by side in a subplot with a title.
20. Take an 8-bit grayscale image and plot the histogram of the image with proper labels (with and without built in histogram function). Show both histograms side by side in a subplot with a title.
21. Take an 8-bit grayscale image and plot the histogram equalized image as well as its histogram with proper labels (with and without built in histogram function). Show both histograms side by side in a subplot with a title. Show both equalized image side by side in a subplot with a title.

Task 05 – Smoothing Filters

22. Take a 6x6 NumPy array apply convolution operation of the array. Use zero padding and consider a 3x3 mask/kernel for convolution (with and without built in function). Show both input and output array. Show both input and output NumPy array into an image and show them side by side in a subplot with a title.
23. Take an 8-bit grayscale image and apply smoothing operation by using mean filter (with and without built in image smoothing function). Show both input and output image side by side in a subplot with a title.
24. Take an 8-bit grayscale image and apply smoothing operation by using weighted averaging filter (with and without built in image smoothing function). Show both input and output image side by side in a subplot with a title.
25. Take an 8-bit grayscale image and apply smoothing operation by using gaussian filter (with and without built in image smoothing function). Show both input and output image side by side in a subplot with a title.

Task 06 - Sharpening Filters

26. Take an 8-bit grayscale image and apply sharpening operation by using laplacian filter (with and without built in image sharpening function). Show both input and output image side by side in a subplot with a title.
27. Take an 8-bit grayscale image and apply sharpening operation by using composite laplacian filter (with and without built in image sharpening function). Show both input and output image side by side in a subplot with a title.
28. Take an 8-bit grayscale image and calculate the gradient of image as well as gradient orientation and gradient magnitude.

Task 07 – Edge Detection

29. Take an 8-bit grayscale image and apply edge detection by using roberts operator (with and without built in function). Show both input and output image side by side in a subplot with a title.
30. Take an 8-bit grayscale image and apply edge detection by using sobel operator (with and without built in function). Show both input and output image side by side in a subplot with a title.
31. Take an 8-bit grayscale image and apply edge detection by using prewitt operator (with and without built in function). Show both input and output image side by side in a subplot with a title.
32. Take an 8-bit grayscale image and apply sharpening operation by using unsharp masking and high boost filtering (with k = 1, 2, 3, 4). Show both input and output image side by side in a subplot with a title.

Task 08 - Segmentation

33. Using OpenCV, perform Thresholding, Global Thresholding, Adaptive Thresholding, Otsu Thresholding, Edge Detection (Sobel Edge Detection, Laplacian Edge Detection, Canny Edge Detector), and Hough Line Transformation. Show results in separate plots.
34. Manually perform Thresholding on a gray scale image.
35. Manually perform Sobel Edge Detection with first-order derivative in the X-direction and the Y-direction. Show all the resultant figures in a single plot.