Assignment-1
Advanced Computer Vision

-By Ruchir Namjoshi
002803974

A1. The calibration matrix after verifying is reported below.

```
Intrinsic Matrix:
[[2.02100114e+03 0.00000000e+00 9.28608282e+02]
 [0.00000000e+00 2.04959675e+03 4.87634022e+02]
 [0.00000000e+00 0.00000000e+00 1.00000000e+00]]
```

The Python file contains the whole code for getting and verifying the calibration matrix.

A2. The intrinsic and extrinsic parameters, the Rotation matrix and the angles of rotation along each axis are given below.

```
Intrinsic Matrix:
[[2.02100114e+03 0.00000000e+00 9.28608282e+02]
 [0.00000000e+00 2.04959675e+03 4.87634022e+02]
 [0.00000000e+00 0.00000000e+00 1.00000000e+00]]
----------------------------------------------------------------------
Extrinsic Rotation Matrix:
[[ 0.99900082 -0.04141265  0.01680367]
 [ 0.01733315  0.70557862  0.70841963]
 [-0.04119384 -0.70742053  0.70559143]]
----------------------------------------------------------------------
Extrinsic Translation Vector:
[[-41.57820113]
 [-68.12964785]
 [369.68556532]]
----------------------------------------------------------------------
Rotation angles (degrees) around x, y, z axes:
[-45.07416735   2.36090135   0.99401005]
```

Full experiment is performed in the python file.

A3. Real-world dimensions of an object are calculated and marked over the frame itself-

Assumption – fixed height,
Intrinsic Parameters obtained above are used
Perspective projection equations are used to calculate real-world dimensions in millimetres.

A4. A basic web app using Flask and HTML is created to find the dimensions of an object in real time-

The application works in real-time by detecting an object in each frame making a boundary around it and showing its dimensions on the video frame itself.
The flask server runs on the app.py file. It needs camera_mtx.npy and dist_coeffs.npy files as input from previous steps.
The app runs on an index.html file.

The video shows real-time working demonstration of the app

Link for the GitHub repository - https://github.com/ruchirnamjoshi/module-1-CV-