Homework-10

Question 1

You are given the following values of the camera calibration parameters:

$$f = 2, \quad u_0 = 0, \quad v_0 = 1$$

Compute the image location of the following 3D point:

$$X = 7, \quad Y = 13, \quad Z = 2$$

Answer:

Question 2

A point at the coordinates (u, v) in the picture is a projection of a 3D point X, Y, Z. Given that the camera calibration parameters f, u_0, v_0, and that the 3D point X, Y, Z is on the plane

$$Z = aX + bY + c,$$

prove that:

$$X = \frac{c(u - u_0)}{f - a(u - u_0) - b(v - v_0)} = \frac{cx}{f - ax - by}, \quad Y = \frac{c(v - v_0)}{f - a(u - u_0) - b(v - v_0)} = \frac{cy}{f - ax - by}.$$

Compute Z as as an explicit function of $u, v, a, b, c, f, u_0, v_0$.

Answer