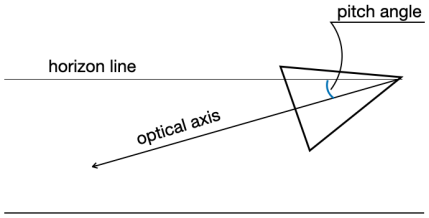
Homework 10

1. Find the intrinsic matrix of the camera, if we know that its optical axis comes through the center of the image of 1200 by 800 pixels and its horizontal field of view is 90 degrees.

2. The vector coordinates are [3, -1, 10] in the camera reference frame. Find the the vector coordinates in the image reference frame, if the focal lengths f = 500 px and the camera image is 800 x 600 px.

3. Find the pitch angle of the camera of the drone if the horizon line is at v = 100 pixels (measured from the top of the image) and the intrinsic matrix K is:



$$K = \begin{bmatrix} 700 & 0 & 600 \\ 0 & 700 & 400 \\ 0 & 0 & 1 \end{bmatrix}$$

The optical axis comes through the center of 1200 by 800 pixels image.

4. Optional.

The camera is placed at 2.5 meters above the floor and directed exactly to the room's corner which is the origin of the global reference frame as shown in the picture.

The roll angle of the camera is 0.

Find the extrinsic camera matrix.