ECE 661 Homework 6

Due: 10/30/2008 Thursday (before the class)

A software camera is defined by the locations of the following four pixels in the image plane:

1. The pixel coordinates (in homogeneous representation) of the image point that corresponds to the world point at infinity along the world X direction: $(5, 100, 1)^T$

2. Same as above exept that now we have the pixel coordinates for the image point that corresponds to the world point at infinity along the world Y direction: $(400, 300, 1)^T$

3. Same as above except that now we have the pixel coordinates for the image point that corresponds to the world point at infinity along the world Z direction: $(500, 490, 1)^T$

4. The pixel coordinates of the image point corresponding to the world origin: $(20, 20, 5)^T$

Which of the following statements is true for this software camera:

   a) It is an ideal pinhole camera
   b) It is a finite projective camera
   c) It is a general projective camera
   d) It is not a camera

If it is one of the three possible cameras listed above, where is the center of projection of the camera located in the world coordinate frame?

Finally, if we have a valid camera, take one of your old images and reproject it through this camera to see what you get. Oviously, before you can carry out this reprojection, you will have to place your old 2-D image somewhere in front of your software camera. If you wish, you can place your old image at a distance of two focal lengths from the camera center, with the principal axis passing through the center of your old image. Assume that the old image is placed parallel to the sensor plane.

Notes.

- Clearly identify the steps you have taken to solve the problem with your own words.

- Your grade depends on the completeness and clarity of your work as well as the result.