Vision 7 - Pose estimation, 2D -> 3D

1. What are the three general approaches for single image-based pose estimation we discussed in class?
2. Homography
   2.1. What kind of objects is the Homography based pose estimation applicable to?
   2.2. What assumption do we need to make about the plane coordinate system for the Homography to be applicable?
   2.3. Once we have estimated the Homography how can we get the pose of the plane relative to the camera? What equation do we use here as a basis? What are the steps?
   2.4. Compute the rotation and translation that aligns the plane coordinate system with the camera coordinate system given the Homography H that maps from the plane to the image.

$$K * \bar{A} = \begin{pmatrix} 1000 & 0 & 500 \\ 0 & 1000 & 500 \\ 0 & 0 & 1 \end{pmatrix};$$

$$H_{left} = \begin{pmatrix} 0 & 2500 & -4500 \\ 2500 & 0 & 8000 \\ 0 & 0 & 1 \end{pmatrix};$$

3. P6P/P3P
   3.1. Which parameters will the P6P approach estimate?
   3.2. How does P6P work?
   3.3. What is the disadvantage of P6P over P3P? How can we employ the Iterative Approach to correct for this?
   3.4. What geometric property is the basis of the P3P approach (as discussed in class)? Draw the underlying geometry. [SCANNING]
   3.5. What is the basic equation for the Iterative Approach? How is the error defined?
4. Template based
   4.1. What is the basic approach of template/view-based approaches for pose estimation? (Basic steps without streamlining speeding up the process. Think simple.)
   4.2. How do we compare the images?
      4.2.1. What images do we typically use here for the comparison (colour, greyscale, intensity, …)?
      4.2.2. How do we then compare the actual images? Mention/describe one of the two methods discussed in class.
   4.3. How do we speed up the matching? Mention the two discussed approaches.
   4.4. How do aspect graphs work?
   4.5. Why is a pose correction needed at the end of discussed pose estimation process?
   4.6. What components are you correcting for?