Vision 3 - Matching + Dense Stereo

1. Make a drawing of a stereo setup in case of a rectified system. Indicate the camera centres, a 3D point, the projection onto time image planes, the image planes, the information in the images required to compute the 3D point. [SCANNING]
2. What is disparity? How does one compute it?
3. How can you compute the depth given disparity (d), baseline (B) and focal length (f)?
4. Given the pixel location (measured relative to the image center) in the left image (p), disparity (d), baseline (B), and focal length (f) compute the 3D position:

$$p = \begin{bmatrix} -222 \\ 333 \end{bmatrix}; d = 77px; f = 1234px; B = 0.1m$$

5. What are the three fundamental problems that occur during stereo matching?
6. Stereo matching relies heavily on the reflectance function. What assumption is being made here? Is that in reality always given? What kind of objects/materials do not follow that assumption?
7. What is the assumption in the disparity gradient criteria?
8. Describe a basic dense stereo algorithm? How can you compare pixel locations? How can you compare regions around pixel locations? (We talked about four different simple metrics, give one.)
9. What are the four steps in the discussed stereo matching taxonomy?
10. What is the trade-off given by the size of the window in window based stereo matching algorithms?
11. What are the steps you need to take to compute a point cloud using dense stereo (given an initially unknown stereo camera system)?