



Q1. Explain the process of generating a DEM automatically from a stereo-pair of digital images. Specify the key input required for the process.

Referring to the stereo-pair of lab. 1, assume that a point p is one of the generated grid points that the following measured pixel coordinates:

$$c_p = 2673 \quad \text{and} \quad r_p = 891 \quad (\text{on the left image}), \text{ and} \\ c_{p'} = 614 \quad \text{and} \quad r_{p'} = 793 \quad (\text{on the right image})$$

Explain in mathematical procedure how to calculate the 3-D ground coordinates of point P by space intersection by employing collinearity condition equations.

Q2. Explain the process automatic generation of digital orthophotos. What are the key input required for the process?

Referring to the stereo-pair of lab. 1, assume that a point P is one of the generated DEM points that the following 3-D ground coordinates:

$$X_p = 239778 \text{ m} , Y_p = 1189782 \text{ m} , Z_p = 88.41 \text{ m}.$$

Explain in mathematical procedure how to calculate the pixel coordinates of the point in each of the left and right images and determine the related pixel values using nearest neighbor interpolation.

Q3. Clarify the function of image resampling and the cases in which it is a must. Referring to the 4x4 patch of a digital image given below, use the nearest neighbor and bilinear interpolation methods to get the interpolated value at the fractional locations ($r=856.72, c=542.64$) and ($r=858.42, c=544.66$).

	c:542	c:543	c:544	c:545
r:856	58	56	65	63
r:857	54	61	67	59
r:858	52	57	60	53
r:859	53	49	51	48