Benha University
Faculty of Engineering - Shoubra
Surveying Engineering Department
Fourth Year

Year: 2017/2018
Semester: Second
Advanced Photogrammetry
Assignment No.: 1

Q1. A standard aerial photo (9' by 9') is scanned with a resolution of 1200 dpi (dot per inch). Determine the size of resulted image in pixel units and the image pixel size in mm. Calculate the equivalent ground sample distance, given that the camera focal length is 153 mm and the flying height above ground is 1820 m.

Q2. The column and row coordinates of a point (a) on a standard aerial photo scanned with a 600 dpi resolution are 1960 and 3530 pixels, respectively. Compute the point coordinates in mm in the photographic coordinate system, related to the image center.

Q3. Given a point (P) lying on the image of Q2. Compute the point coordinates in pixels in the pixel coordinate system, assuming that its coordinates in the photographic coordinate system, related to the image center, are x_p = -78.36 mm and y_p = +66.43 mm.

Q4. Given a stereo pair of standard aerial images having 300 dpi resolution and 60% overlap. A point (q) appears on the right image where c_q = 670 pixel and r_q = 2160 pixel. Calculate the approximate position in pixels of its conjugate in the left image.

Q5. Given below the measured coordinates of the four fiducials of an aerial image in the pixel coordinate system, as well as the corresponding calibrated coordinates in the photo coordinate system. Compute the similarity transformation parameters necessary to convert from the pixel coordinate system to the photo coordinate system.

Fiducial No.	Measured Coordinates (pixel)		Calibrated Coordinates (mm)	
	x' (c)	y' (r)	x	y
1	48.17	2699.97	-113.002	0.009
2	5353.13	2699.14	122.991	0.035
3	2700.22	47.64	0.009	112.996
4	2700.55	5352.72	-0.017	-113.003

Q6. Solve Q5 again using a 2-D affine transformation. Compare the precision of the two transformation models.

Q7. Use the affine transformation parameters computed in Q6 to determine the photo coordinates of a point p that has pixel coordinates of c_p = 1980 pixels and r_p = 1670 pixels on the image.