

CE 603 Photogrammetry II

Homework 2 Rotation matrix derivation and orbit computations

1. Derive the expression for the rotation matrix based on rotation about a fixed line, as found on page 450 of the text.

$$\begin{bmatrix} \alpha & m_{12} & m_{13} \\ \beta & m_{22} & m_{23} \\ \gamma & m_{32} & m_{33} \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \theta & -\sin \theta \\ 0 & \sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} \alpha & \beta & \gamma \\ m_{12} & m_{22} & m_{32} \\ m_{13} & m_{23} & m_{33} \end{bmatrix}$$

You will need some properties of orthogonal matrices, such as inner products of rows and columns with themselves are 1, with other rows and columns are 0. (transpose = inverse, same thing), also an orthogonal matrix equals its cofactor matrix (see CE502)

2. Find the file dg1.eph on the geomatics drive under ce603, take the first ephemeris point state vector and convert it to kepler elements.