ME 115(a): Homework #2

(Due Thursday Oct. 19, 2000)

Problem 1: Let Z-Y-X Euler angles be denoted by ψ, ϕ, and γ. That is, successfully rotate a body about its body fixed z, y, and x axes by the angles ψ, ϕ, and γ.

- **Part (a):** Develop an expression for the rotation matrix that describes the Z-Y-X rotation as a function of the angles ψ, ϕ, and γ.
- **Part (b):** Given a rotation matrix of the form:

$$R = \begin{bmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \\ r_{31} & r_{32} & r_{33} \end{bmatrix}$$

compute the angles ψ, ϕ, and γ as a function of the r_{ij}.

Problem 2: Consider the following rotation matrix:

$$\begin{bmatrix} 0.882772 & -0.416266 & 0.217798 \\ 0.44976 & 0.882772 & -0.135756 \\ -0.135756 & 0.217798 & 0.966506 \end{bmatrix}$$

- **Part (a):** Find the axis of rotation and angle of rotation associated with this rotation.
- **Part (b):** Using the results of problem 1, find the z-y-x euler angles of the above rotation.

Problem 3: Do Problem 4(a,b) in Chapter 2 of MLS.

Problem 4: Do Problem 6(a,b,d) in Chapter 2 of MLS.

Problem 5: Do Problem 8(b) in Chapter 2 of MLS.