ME 115(a): Homework #2

(Due Thursday Jan 31, 2002)

Problem 1:

- **(a)** Do problem 3(c) in the MLS text.
- **(b)** Let
$$R = \begin{bmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \\ r_{31} & r_{32} & r_{33} \end{bmatrix}$$
be a matrix in SO(3). Show that $cof(r_i i) = r_{ii}$.

Problem 2: Problem 5(c) of the MLS text.

Problem 3: Let Z-X-Y Euler angles be denoted by ψ, ϕ, and γ. That is, successfully rotate a body about its body fixed z, x, and y 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 4: Do Problem 4(a,b) in Chapter 2 of MLS.

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