ME 115(a): Homework #2

(Due Wednesday, Feb. 1, 2012)

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 $cof(r_{ii}) = r_{ii}$ for matrices in $SO(3)$.

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

Problem 3: Can every orthogonal matrix be represented by a the exponential of a real matrix? That is, if $A \in \mathcal{O}(n)$, can A be represented by

$$A = e^C$$

for some *real* matrix C? (Hint: the determinant of e^C can be expressed as an exponential.)

Problem 4: Consider the following rotation matrix:

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

Find the axis of rotation and angle of rotation associated with this rotation.

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