Problem 1: (15 Points) Do Problem 4(a,b) in Chapter 2 of MLS.

Problem 2: (5 points) Do Problem 3(c) in Chapter 2 of MLS.

Problem 3: (10 points) Do Problem 8(b,c) in Chapter 2 of MLS.

Problem 4: (15 points) Let Z-Y-X Euler angles be denoted by $\psi$, $\phi$, and $\gamma$. That is, successfully rotate a body about its body fixed $z$, $y$, and $x$ axes by the angles $\psi$, $\phi$, and $\gamma$.

- **Part (a):** Develop an expression for the rotation matrix that describes the Z-Y-X rotation as a function of the angles $\psi$, $\phi$, and $\gamma$.

- **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 $\psi$, $\phi$, and $\gamma$ as a function of the $r_{ij}$.

Problem 5: (5 points) Do Problem 10(b) in Chapter 2 of MLS. There is no need to answer the second part of the question concerning the surjectivity of the exponential map.