

ME/CS 133(a): Homework #2

(Due Wednesday, Oct. 18, 2017)

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 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 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.