

# ECE 417 --- ROBOTICS

## Homework 5, Spring 2021

1. Convert the matrix  $\mathbf{R}$  (aka  ${}^{xyz}\mathbf{R}_{uvw}$ ) of Homework 1 to System II Euler angles (2 solutions)
2. Convert the matrix  $\mathbf{R}$  (aka  ${}^{xyz}\mathbf{R}_{uvw}$ ) of Homework 1 to axis-angle form (2 solutions)
3. Convert System II Euler angles  $(90^\circ, 90^\circ, 90^\circ)^T$  to a 3x3 rotation matrix
4. Convert System II Euler angles  $(30^\circ, 60^\circ, 90^\circ)^T$  to a 3x3 rotation matrix
5. Convert axis-angle given by a rotation of  $120^\circ$  about an axis through  $(1, -1, 1)^T$  to a 3x3 rotation matrix. (Remember to normalize the vector first.)
6. For a rotation about the X axis by  $90^\circ$ , convert to
  - a. System II Euler angles (2 solutions)
  - b. Axis-angle form (2 solutions)
  - c. A 3x3 rotation matrix