EEE4027 – Robotics & Control Assignment 1
Due date October 24th

1. Compute the Homogeneous transformation representing following four sequence motion

a. A rotation of 45^0 about X-axis,

b. A translation of 2 units along Y-axis,

c. A translation of 3 units along Z-axis and finally

d. A rotation of 60^0 about X-axis.

Determine the final Homogeneous transformation matrix

2. At the end of the following transformations, determine the final co-ordinates of frame A, which is attached to the reference frame and positioned at ${}^{A}P = \begin{bmatrix} 4 & 7 & 9 \end{bmatrix}^{T}$.

a. A rotation of -180^0 about the Z axis

b. c. A rotation of 90^0 about the current o-axis

c. A translation of 2 units about the Z axis, 5 units about the Y axis and 3 units about the X axis

d. Finally, a rotation of -90^0 about the current a-axis

3. The position and orientation of a Cartesian RPY robot is

$$ {}^{R}T_{P} = \begin{bmatrix} 0 & -0.866 & 0.5 & 3 \\ 0.5 & 0.433 & 0.75 & 1 \\ -0.866 & 0.25 & 0.433 & 5 \\ 0 & 0 & 0 & 1 \end{bmatrix} $$

Derive the inverse kinematic equations and calculate the roll, pitch, yaw angles and displacements.