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% Jesse Wynn HW2 ME 537 Robotics
clc
clear all
close all

% Problem 12 from Chapter 2

% rpy (phi, theta, psi)
syms phi theta psi

% create a rotation from they roll pitch and yaw angles
R = rpy2r(phi, theta, psi)

% use the rotation to transform a unit vector in the z-dir
vec = [0 0 1]';

T = R*vec

% you can now figure out the solution using a system of equations

R =

[ cos(psi)*cos(theta), cos(psi)*sin(phi)*sin(theta) -
  cos(phi)*sin(psi), sin(phi)*sin(psi) + cos(phi)*cos(psi)*sin(theta)]
[ cos(theta)*sin(psi), cos(phi)*cos(psi) +
  sin(phi)*sin(psi)*sin(theta), cos(phi)*sin(psi)*sin(theta) -
  cos(psi)*sin(phi)]
[      -sin(theta),
  cos(theta)*sin(phi),
  cos(phi)*cos(theta)]

T =

sin(phi)*sin(psi) + cos(phi)*cos(psi)*sin(theta)
cos(phi)*sin(psi)*sin(theta) - cos(psi)*sin(phi)
cos(phi)*cos(theta)

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