**Problem 2)**

function [phi,theta,psi] = rotationMatrixToEulerAngles313(R)

if (abs(R(3,1)) ~= 1)

theta1 = -asin(R(3,1));

theta2 = pi - theta1;

psi1 = atan2(R(3,2)/cos(theta1),R(3,3)/cos(theta1));

psi2 = atan2(R(3,2)/cos(theta2),R(3,3)/cos(theta2));

phi1 = atan2(R(2,1)/cos(theta1),R(1,1)/cos(theta1));

phi2 = atan2(R(2,1)/cos(theta2),R(1,1)/cos(theta2));

theta = [theta1,theta2];

psi = [psi1,psi2];

phi = [phi1,phi2];

else

phi = 0;

if(R(3,1) == -1)

theta = pi/2;

psi = phi + atan2(R(1,2),R(1,3));

else

theta = -pi/2;

psi = -phi + atan2(-R(1,2),-R(1,3));

end

end

function [R] = eulerAnglesToRotationMatrix313(phi,theta,psi)

R = [cos(theta)\*cos(phi) sin(psi)\*sin(theta)\*cos(phi)-cos(psi)\*sin(phi)...

cos(psi)\*sin(theta)\*cos(phi)+sin(psi)\*sin(phi);

cos(theta)\*sin(phi) sin(psi)\*sin(theta)\*sin(phi)+cos(psi)\*cos(phi) ...

cos(psi)\*sin(theta)\*sin(phi)-sin(psi)\*cos(phi);

-sin(theta) sin(psi)\*cos(theta) cos(psi)\*cos(theta)];

R = eulerAnglesToRotationMatrix313(pi/5,3\*pi/7,pi/17)

R =

0.1800 -0.4328 0.8833

0.1308 0.9005 0.4146

-0.9749 0.0409 0.2187

Two sets of answers for rotationMatrixToEulerAngles313, the sets are lined up vertically.

phi =

2.4734 -0.6682

theta =

-0.0773 3.2189

psi =

-1.3370 1.8046