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%MATLAB CODE ASSIGNMENT 2 ENPM662
%ANSWER 2
clc
clear all
%writing the code for A matrices
%%declaring the variables and symbols for the matrix multiplication
syms d1 d2 d3 l1 l2 l3

theta1 = -90;
theta2 = -90;
theta3 = 90;

a1=0;
a2=0;
a3=0;

alpha1=-90;
alpha2=-90;
alpha3=0;
%%The general form of the matrices are obtained by multiplying the
%%following

%%first A matrix
Rz_theta1=[cosd(theta1) -sind(theta1) 0 0;sind(theta1) cosd(theta1) 0
0;0 0 1 0;0 0 0 1];
Rx_alpha1=[1 0 0 0;0 cosd(alpha1) -sind(alpha1) 0;0 sind(alpha1)
cosd(alpha1) 0;0 0 0 1];
Tz_d1=[1 0 0 0;0 1 0 0;0 0 1 (l1+d1);0 0 0 1];
Tx_a1=[1 0 0 a1;0 1 0 0;0 0 1 0;0 0 0 1];
%%second A matrix
Rz_theta2=[cosd(theta2) -sind(theta2) 0 0;sind(theta2) cosd(theta2) 0
0;0 0 1 0;0 0 0 1];
Rx_alpha2=[1 0 0 0;0 cosd(alpha2) -sind(alpha2) 0;0 sind(alpha2)
cosd(alpha2) 0;0 0 0 1];
Tz_d2=[1 0 0 0;0 1 0 0;0 0 1 (l2+d2);0 0 0 1];
Tx_a2=[1 0 0 a2;0 1 0 0;0 0 1 0;0 0 0 1];
%%third A matrix
Rz_theta3=[cosd(theta3) -sind(theta3) 0 0;sind(theta3) cosd(theta3) 0
0;0 0 1 0;0 0 0 1];
Rx_alpha3=[1 0 0 0;0 cosd(alpha3) -sind(alpha3) 0;0 sind(alpha3)
cosd(alpha3) 0;0 0 0 1];
Tz_d3=[1 0 0 0;0 1 0 0;0 0 1 (l3+d3);0 0 0 1];
Tx_a3=[1 0 0 a3;0 1 0 0;0 0 1 0;0 0 0 1];
%%Matrix multiplicaiion
A_1=Rz_theta1*Tz_d1*Tx_a1*Rx_alpha1
A_2=Rz_theta2*Tz_d2*Tx_a2*Rx_alpha2
A_3=Rz_theta3*Tz_d3*Tx_a3*Rx_alpha3
%%Multiptlying to get the T matrix we get
T=A_1*A_2*A_3

A_1 =

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[ 0, 0, 1, 0]
[-1, 0, 0, 0]
[ 0, -1, 0, d1 + l1]
[ 0, 0, 0, 1]
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A_2 =

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[ 0, 0, 1, 0]
[-1, 0, 0, 0]
[ 0, -1, 0, d2 + l2]
[ 0, 0, 0, 1]
```

A_3 =

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[ 0, -1, 0, 0]
[ 1, 0, 0, 0]
[ 0, 0, 1, d3 + l3]
[ 0, 0, 0, 1]
```

T =

```
[ -1, 0, 0, d2 + l2]
[ 0, 0, -1, - d3 - l3]
[ 0, -1, 0, d1 + l1]
[ 0, 0, 0, 1]
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