Homework 1

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RBE501

This is DH table for the Funac

```
%% LaTeX Markup Example
% This is a table:
%
% <latex>
% \begin{tabular}{|c|c|} \hline
% $n$ & $n!$ \\ \hline
% 1 & 1 \\
% 2 & 2 \\
% 3 & 6 \\ \hline
% \end{tabular}
% </latex>
```

Arm set up

The DH paraemeters are inputed to their links,

```
links = zeros(6,4); % allocate memory
A = ones(4,4,length(links(:,1)));
T = ones(4,4,length(links(:,1)));
```

Home Position

Plot the home position of the arm. The DH parameters are constructed for each link then passed through the functions getA() and getT() to find the A, T matrixes for the kinmatic chain. A ploting function was written to plot then links, joints, and end effector. This plotting the arm in the home position.

```
theta = [0 0 0 0 0 0]; % set joint angles
links(1,:) = [ 75 90 330 theta(1)];
links(2,:) = [ 300 0 0 theta(2)];
links(3,:) = [ 75 90 0 theta(3)];
links(4,:) = [ 0 -90 320 theta(4)];
links(5,:) = [ 0 90 0 theta(5)];
links(6,:) = [ 0 0 80 theta(6)];

A = getA(links) % calls function that calcualate the A matrixes
```

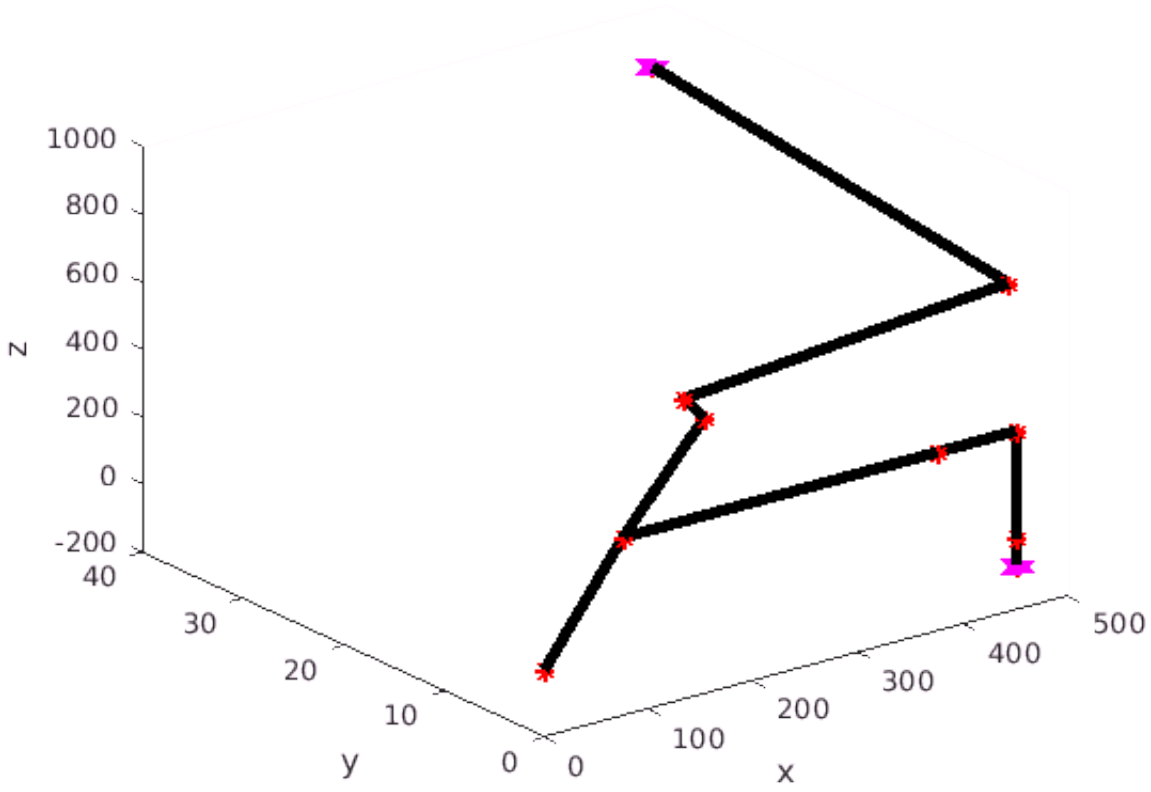
```
A =

(:,:,1) =

    1.0000         0         0   75.0000
         0    0.0000   -1.0000         0
         0    1.0000    0.0000  330.0000
         0         0         0    1.0000


(:,:,2) =

     1     0     0   300
     0     1     0     0
     0     0     1     0
     0     0     0     1


(:,:,3) =

    1.0000         0         0   75.0000
         0    0.0000   -1.0000         0
         0    1.0000    0.0000         0
         0         0         0    1.0000


(:,:,4) =

    1.0000         0         0         0
         0    0.0000    1.0000         0
         0   -1.0000    0.0000  320.0000
         0         0         0    1.0000


(:,:,5) =

    1.0000         0         0         0
         0    0.0000   -1.0000         0
         0    1.0000    0.0000         0
         0         0         0    1.0000


(:,:,6) =

     1     0     0     0
     0     1     0     0
     0     0     1    80
     0     0     0     1
```

```
T = getT(A)% calls function that calcualate the T matrixes
```

```
T =

(:,:,1) =

    1.0000         0         0   75.0000
         0    0.0000   -1.0000         0
         0    1.0000    0.0000  330.0000
         0         0         0    1.0000


(:,:,2) =

    1.0000         0         0  375.0000
```

```
         0    0.0000   -1.0000         0
         0    1.0000    0.0000  330.0000
         0         0         0    1.0000


(:,:,3) =

    1.0000         0         0  450.0000
         0   -1.0000   -0.0000         0
         0    0.0000   -1.0000  330.0000
         0         0         0    1.0000


(:,:,4) =

    1.0000         0         0  450.0000
         0    0.0000   -1.0000   -0.0000
         0    1.0000    0.0000   10.0000
         0         0         0    1.0000


(:,:,5) =

    1.0000         0         0  450.0000
         0   -1.0000   -0.0000   -0.0000
         0    0.0000   -1.0000   10.0000
         0         0         0    1.0000


(:,:,6) =

    1.0000         0         0  450.0000
         0   -1.0000   -0.0000   -0.0000
         0    0.0000   -1.0000  -70.0000
         0         0         0    1.0000
```

```
plotArm(T)% calls function to plot the arm
```



Given Location

This plots the arm at the disred loction

```
clear all;
close all;
theta = [0 75 30 135 -45 60]; % set joint angles
links(1,:) = [ 75 90 330 theta(1)];
links(2,:) = [ 300 0 0 theta(2)];
links(3,:) = [ 75 90 0 theta(3)];
links(4,:) = [ 0 -90 320 theta(4)];
links(5,:) = [ 0 90 0 theta(5)];
links(6,:) = [ 0 0 80 theta(6)];

A = getA(links)
```

```
A =

(:,:,1) =

    1.0000         0         0   75.0000
         0    0.0000   -1.0000         0
         0    1.0000    0.0000  330.0000
         0         0         0    1.0000
```

```
(:,:,2) =

    0.2588   -0.9659         0   77.6457
    0.9659    0.2588         0  289.7777
         0         0    1.0000         0
         0         0         0    1.0000


(:,:,3) =

    0.8660   -0.0000    0.5000   64.9519
    0.5000    0.0000   -0.8660   37.5000
         0    1.0000    0.0000         0
         0         0         0    1.0000


(:,:,4) =

   -0.7071   -0.0000   -0.7071         0
    0.7071   -0.0000   -0.7071         0
         0   -1.0000    0.0000  320.0000
         0         0         0    1.0000


(:,:,5) =

    0.7071    0.0000   -0.7071         0
   -0.7071    0.0000   -0.7071         0
         0    1.0000    0.0000         0
         0         0         0    1.0000


(:,:,6) =

    0.5000   -0.8660         0         0
    0.8660    0.5000         0         0
         0         0    1.0000   80.0000
         0         0         0    1.0000
```

```
T = getT(A)
```

```
T =

(:,:,1) =

    1.0000         0         0   75.0000
         0    0.0000   -1.0000         0
         0    1.0000    0.0000  330.0000
         0         0         0    1.0000


(:,:,2) =

    0.2588   -0.9659         0  152.6457
    0.0000    0.0000   -1.0000    0.0000
    0.9659    0.2588    0.0000  619.7777
         0         0         0    1.0000


(:,:,3) =

   -0.2588   -0.0000    0.9659  133.2343
    0.0000   -1.0000   -0.0000    0.0000
    0.9659    0.0000    0.2588  692.2222
         0         0         0    1.0000
```

```
(:,:,4) =

    0.1830   -0.9659    0.1830  442.3305
   -0.7071    0.0000    0.7071    0.0000
   -0.6830   -0.2588   -0.6830  775.0443
         0         0         0    1.0000


(:,:,5) =

    0.8124    0.1830    0.5536  442.3305
   -0.5000    0.7071    0.5000    0.0000
   -0.3000   -0.6830    0.6660  775.0443
         0         0         0    1.0000


(:,:,6) =

    0.5647   -0.6121    0.5536  486.6188
    0.3624    0.7866    0.5000   40.0000
   -0.7415   -0.0817    0.6660  828.3223
         0         0         0    1.0000
```

```
plotArm(T)
```