

# ECE 761 - Homework #8

Robot Programming (2 day homework)

Several functions for the RRR robot are

```
[Pf, Q] = MoveTo(P0, P1, 2)
```

Move from point P0 to point P1 in 2 seconds.

The final position is saved as Pf

The joint angles are saved every 0.01 second and returned in the array Q

```
[Pf, Q] = CircleXY(P1, Pc, 3);
```

Draw a circle centered at Pc, starting and ending at point P1, taking 3 seconds.

The final position is saved as Pf

The joint angles are saved every 0.01 second and returned in the array Q

```
[Pf, Q] = ArcXY(P1, Pc, pi/4, 3);
```

Draw an arc of a circle centered at Pc, starting and ending at point P1, taking 3 seconds.

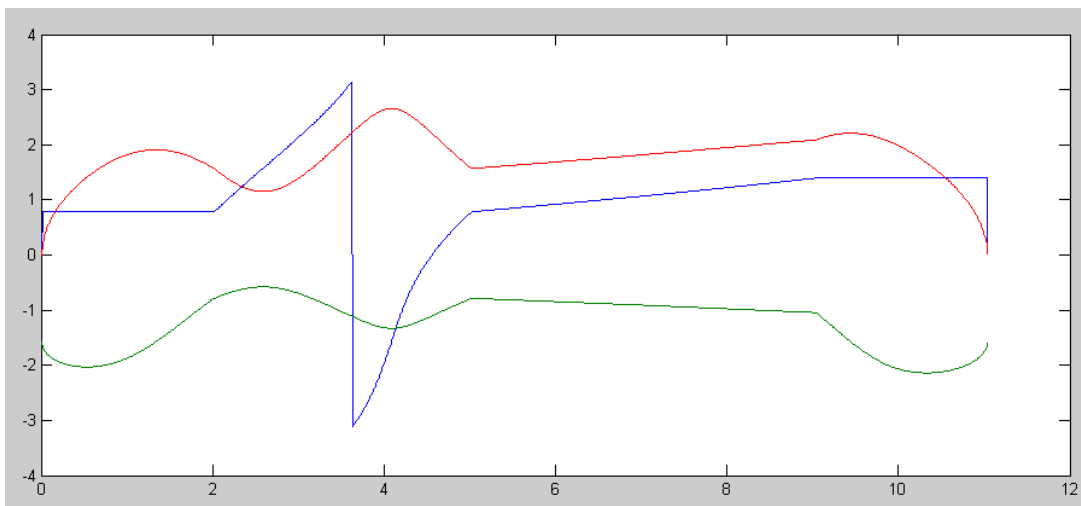
The angle draws in  $\pi/4$  radians (90 degrees)

The final position is saved as Pf

The joint angles are saved every 0.01 second and returned in the array Q

Sample Code:

```
>> P0 = [0,0,150,1]';  
>> P1 = [50;50;50;1];  
  
>> [P1, Q1] = MoveTo(P0, P1, 2);  
>> [P2, Q2] = CircleXY(P1, [0; 30; 50; 1], 3);  
>> [P3, Q3] = ArcXY(P2, [30; 0; 50; 1], pi/4, 4);  
>> [P4, Q4] = MoveTo(P3, P0, 2);  
>> Q = [Q1, Q2, Q3, Q4];  
>> size(Q)  
  
          3          1104  
  
>> t = [1:1104] * 0.01;  
>> clf  
>> plot(t,Q)
```



Joint Angles vs. Time

- 1) Pick a shape to draw (other than a dogwood flower). A Batman symbol or your initials are some suggestions.
- 2) Determine the joint angles to trace out this symbol using MoveTo(), ArC(), Circle() or other commands you create.
- 3) Determine and plot the resulting joint velocities
- 4) Determine and plot the resulting joint accelerations