Report of the homework 3

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Language: MathLab

GitHub link: https://github.com/Damindarov/HW4

Task 1: Forward kinematic

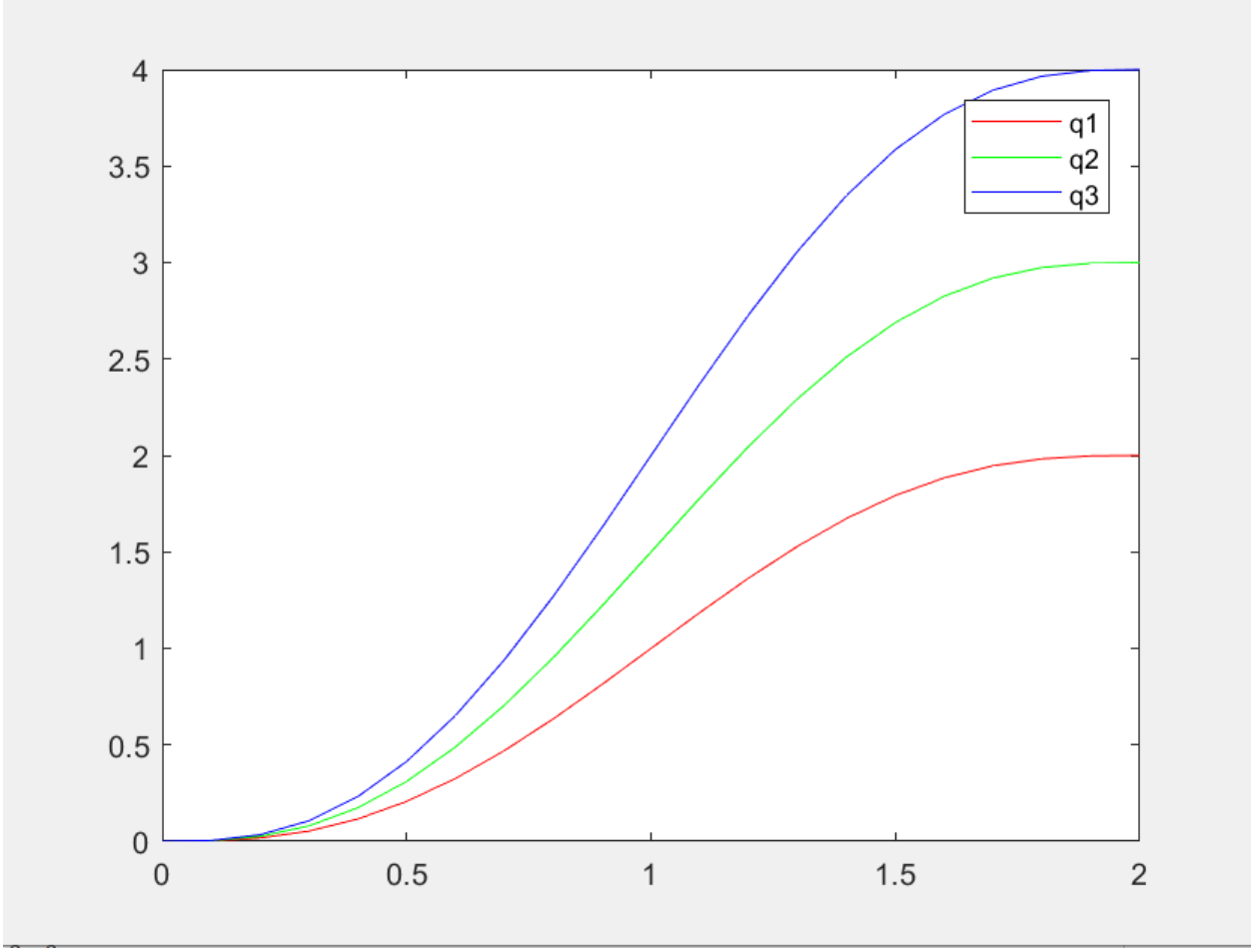
In this task we need solve case finding Jacobian. For this I use numerical method. Symbol result on picture 1:

```
[ -sin(teta1)*(L3*cos(teta2 + teta3) + L2*cos(teta2)), -cos(teta1)*(L3*sin(teta2 + teta3) + L2*sin(teta2)), -L3*sin(teta2 + teta3)*cos(teta1)]
[  cos(teta1)*(L3*cos(teta2 + teta3) + L2*cos(teta2)), -sin(teta1)*(L3*sin(teta2 + teta3) + L2*sin(teta2)), -L3*sin(teta2 + teta3)*sin(teta1)]
[                                                  0,            - L3*cos(teta2 + teta3) - L2*cos(teta2),           -L3*cos(teta2 + teta3)]
[                                                  0,                                    -sin(teta1),                    -sin(teta1)]
[                                                  0,                                     cos(teta1),                     cos(teta1)]
[                                                  1,                                              0,                              0]
```

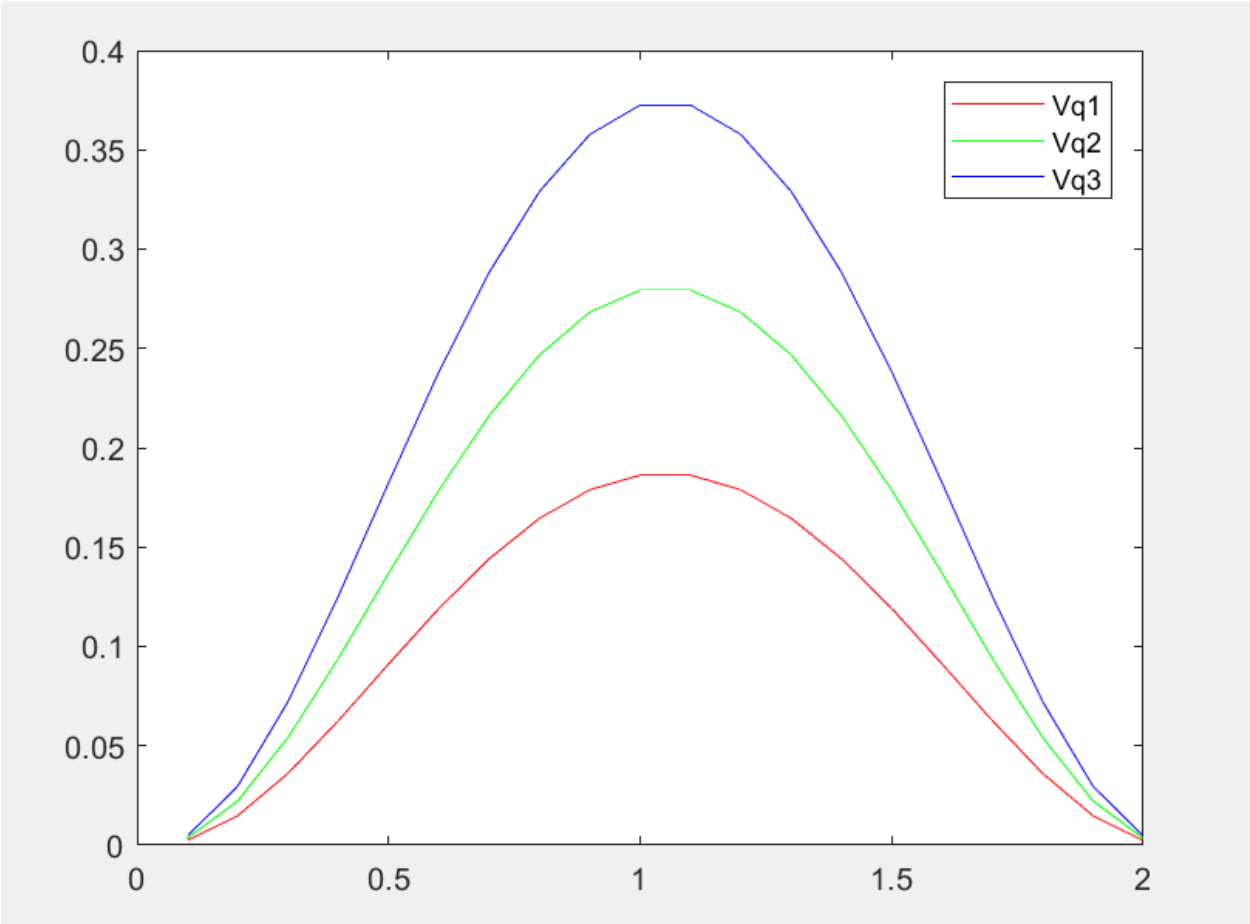
Pic 1. Result of solving Jacobian task

Task 2: Joint trajectory

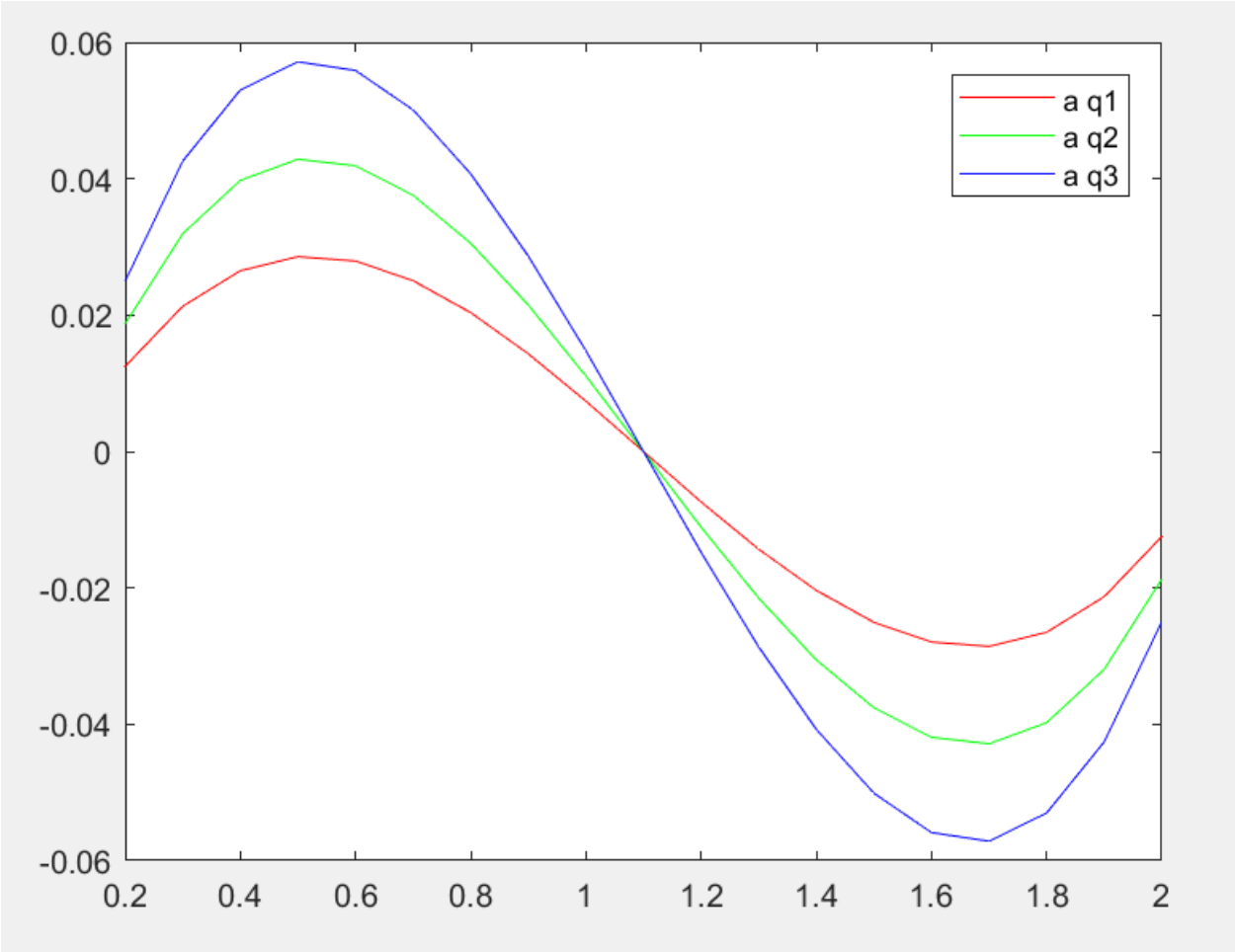
In this task we need solve case finding joint trajectory, velocity and acceleration picture 2a,2b,2c.



Pic 2a. Result of finding trajectory



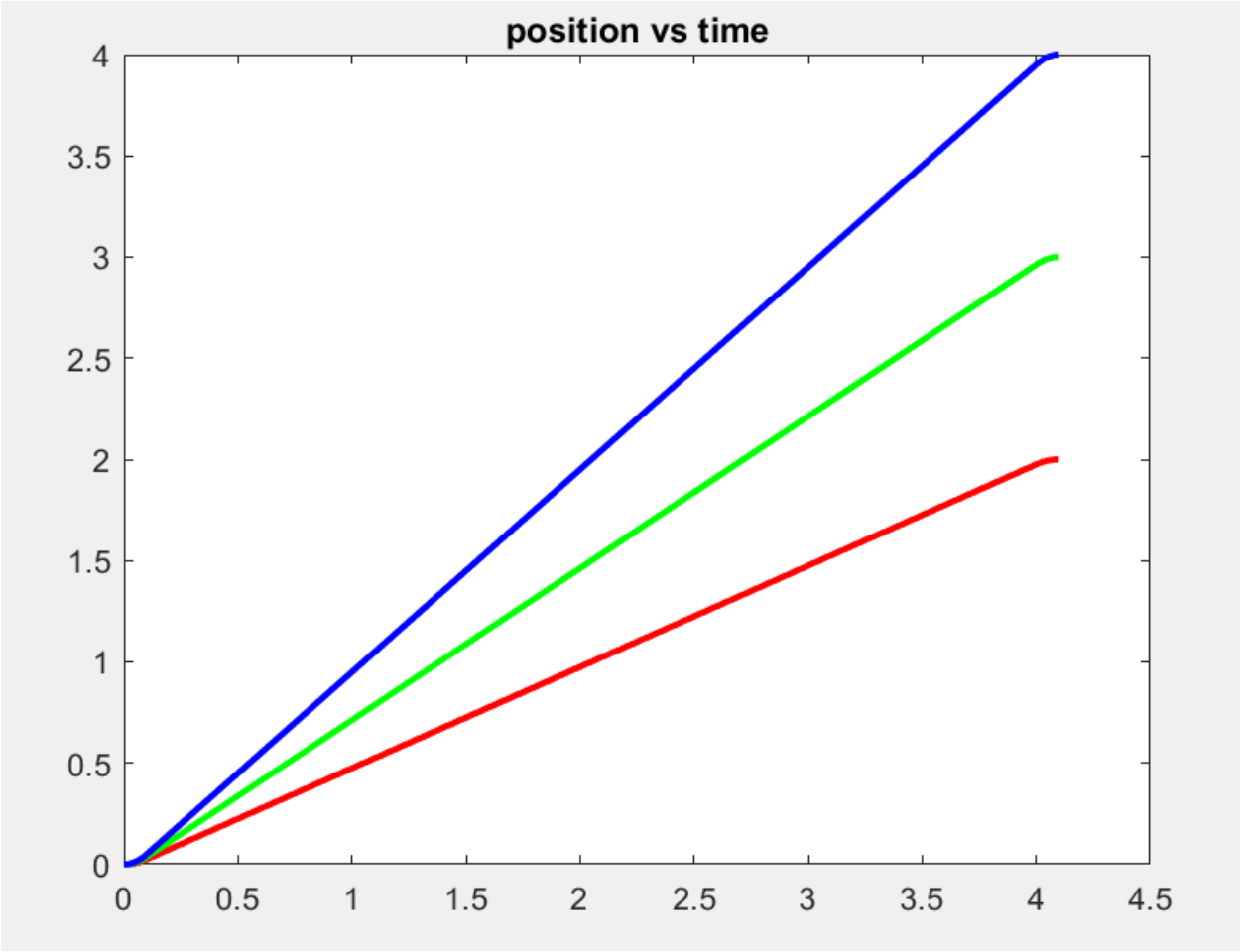
Pic 2b. Result of finding velocity



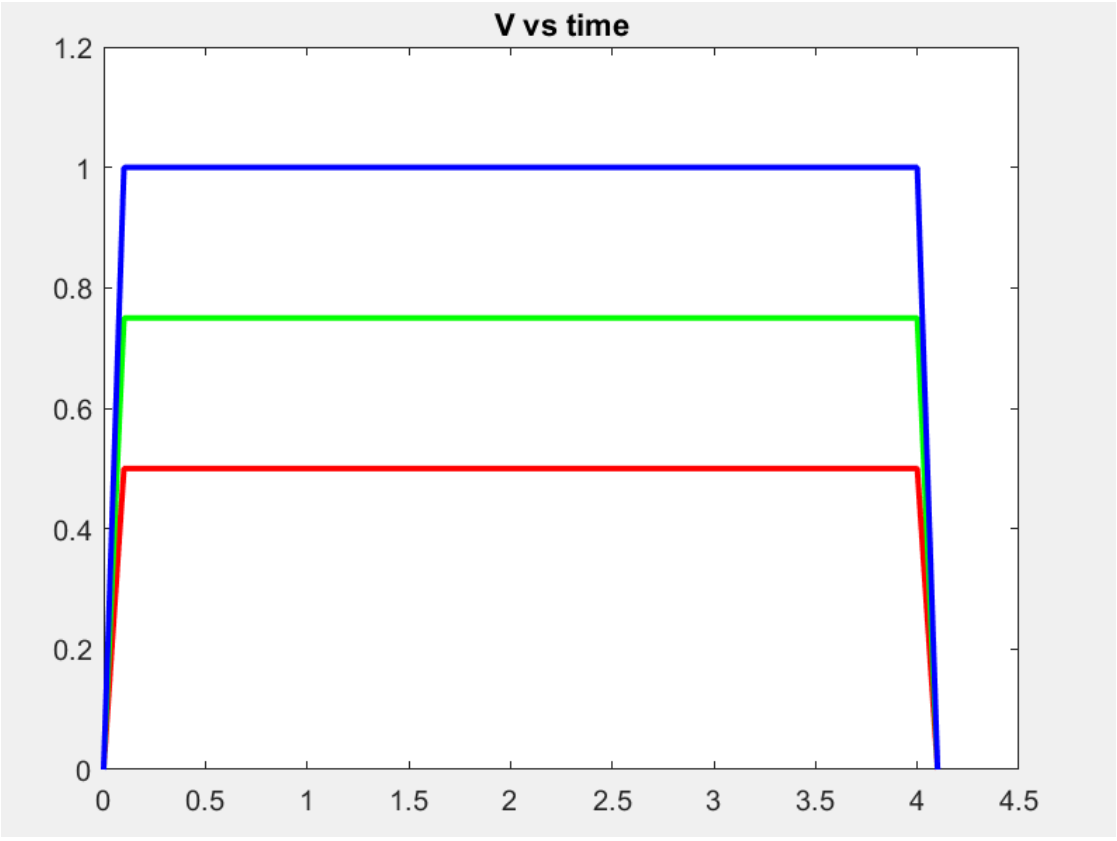
Pic 2c. Result of finding acceleration

Task3: Find joint trajectory for commands PTP

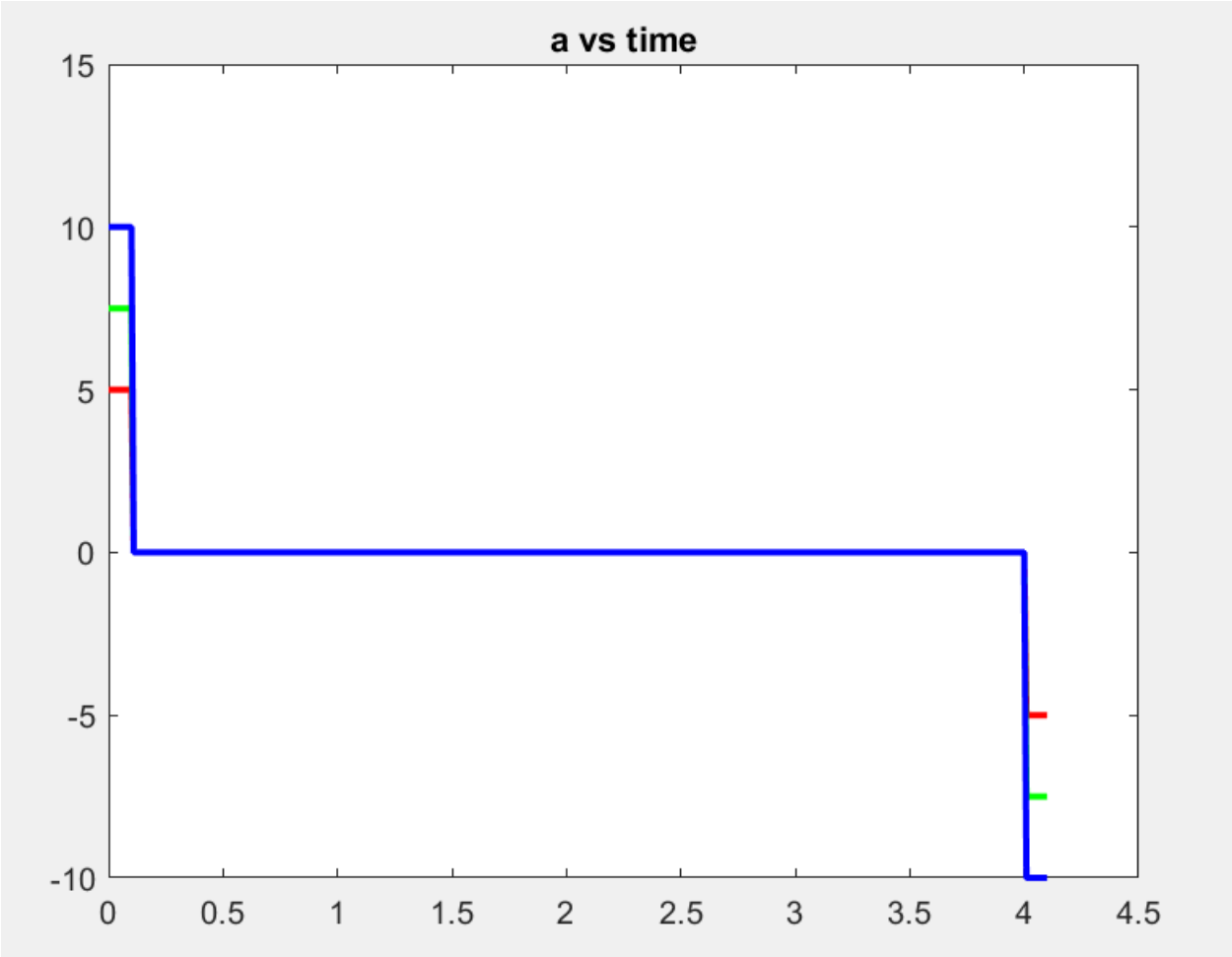
In this task we need compute position, velocity, acceleration vs time. We know maximum velocity, maximum acceleration and frequency. Result on computing on picture 3a,3b,3c. In pictures each joint has its own parameter color.



Pic 3a. Result of finding position



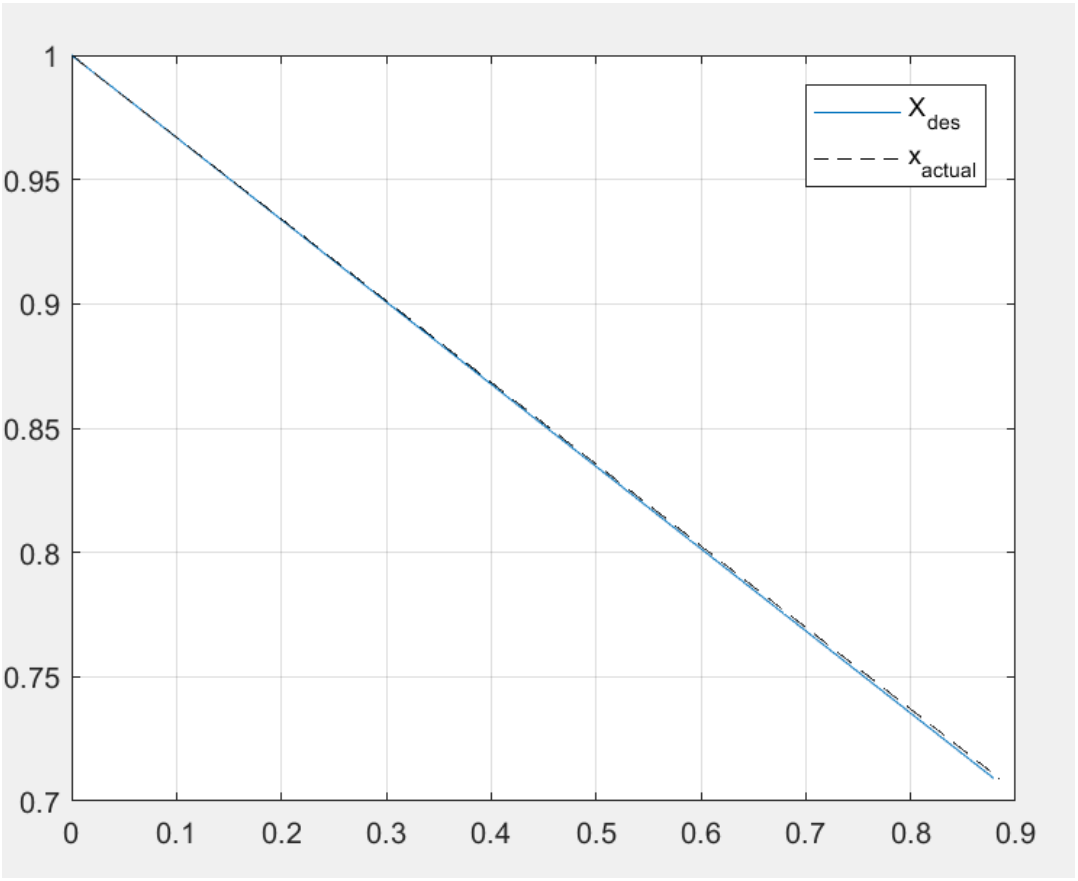
Pic 3b. Result of finding velocity

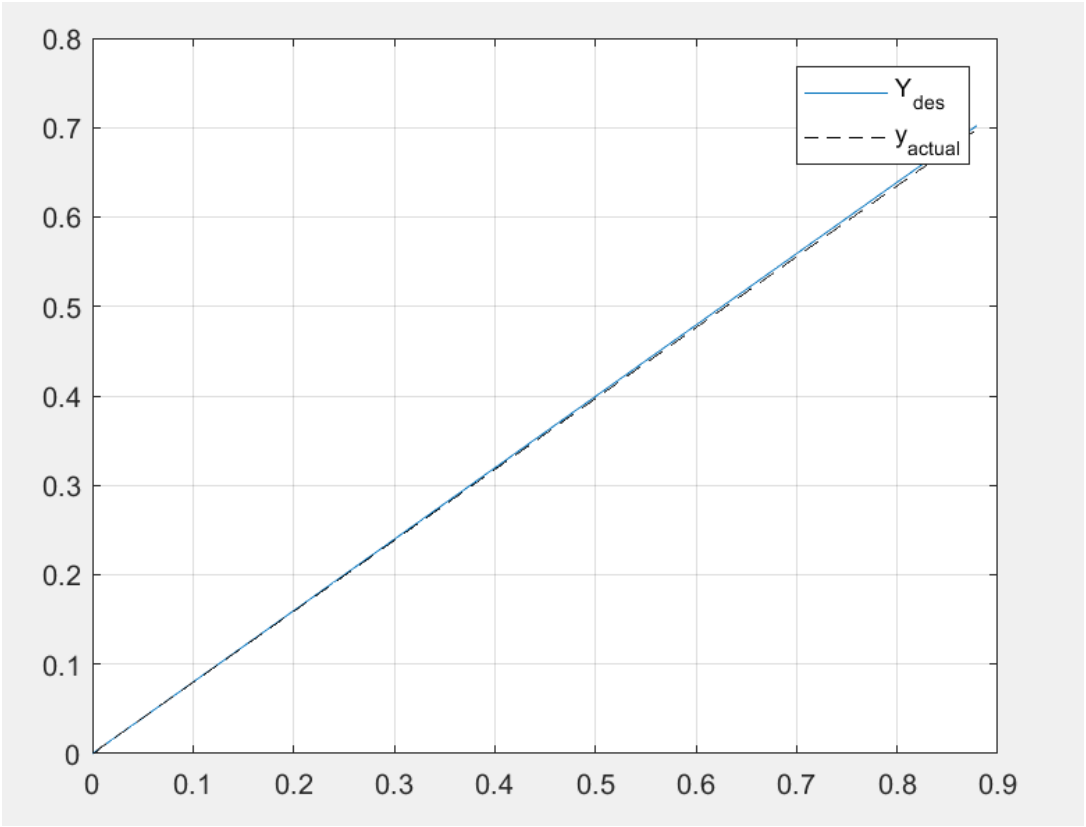


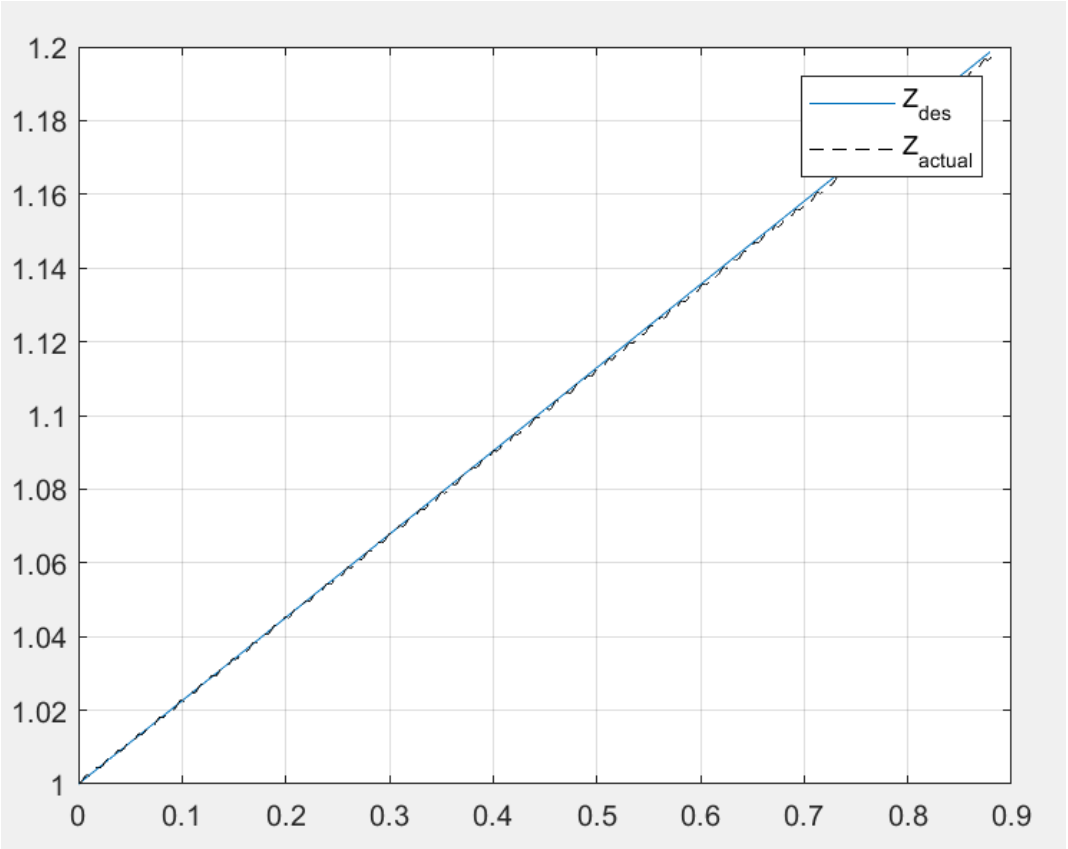
Pic 3c. Result of finding acceleration

Task 4: Find joint trajectory for commands LIN

First step in this task, we find angles joints in start position and finish position, using inverse kinematic. For each joint we find a bunch of positions and velocities, after that for each position we are looking for joint configuration using inverse kinematic and after that for each joints in all position we find trajectory and velocities. Below there will be pictures for each coordinate:


1
0.95
0.9
0.85
0.8
0.75
0.7
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
X des
x actual


0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Y des
y actual


1.2
1.18
1.16
1.14
1.12
1.1
1.08
1.06
1.04
1.02
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Z_des
Z_actual