clear all;

clc

%% 1

% Atviteli fuggveny bevitele

W = tf(1,[1 0.1 1]);

Ts = 0.2;

% D meghatarozasa

D = c2d(W,Ts,'zoh');

% A,B meghatarozasa

B = D.num{1};

B = B(2:end);

A = D.den{1};

% Bplus, Bminus meghatarozasa

roots(B)

%% 2 - Erdemes papiron csinalni

%% 3

% Polusok megadasa

xi = 0.7;

w0 = 1;

s1 = -w0\*xi+j\*w0\*sqrt(1-xi^2);

s2 = conj(s1);

xio = 0.7;

wo = 3;

soinf1 = -wo\*xio+j\*wo\*sqrt(1-xio^2)

soinf2 = conj(soinf1)

% Polusok kifejezese

z1 = exp(s1\*Ts);

z2 = exp(s2\*Ts);

zo1 = exp(soinf1\*Ts);

zo2 = exp(soinf2\*Ts);

% Am, A0 megadasa

Am = poly([z1, z2])

A0 = poly([zo1,zo2])

%% 4

% a Bm'-t gyors meghatarozzuk, mert az egyszeru

Bmv = polyval(Am,1)/polyval(B,1)

% AA,BB,CC

AA = conv(A, [1 -1]);

BB = B;

CC = conv(Am, A0);

% Diophantoszi egyenlet megoldasa

atilde = AA';

btilde = [BB zeros(1,2)]';

brow = zeros(1,3);

Dmat = [atilde toeplitz(btilde, brow)];

Dvec = [CC(2:4)' - AA(2:end)' ; CC(end)];

RS = inv(Dmat)\*Dvec;

R1v = [1 RS(1)]

S = RS(2:end)'

%% 5

R = conv([1 -1],R1v)

T = Bmv\*A0