Problem 3

# **CODE:**

% PROBLEM 3

% Clear workspace

close all

clear

clc

% Define the system matrices

A1 = [-4, 1; 0, 2];

B1 = [1; 0];

A2 = [-3, 2; 4, 1];

B2 = [0; 1];

% Compute controllability matrices

R1 = ctrb(A1, B1);

R2 = ctrb(A2, B2);

% Check rank of controllability matrices

if(rank(R1)==size(R1,2))

fprintf("System 1 can be stabilized by a static state-feedback control law")

% If stabilizable, find state feedback gains

desiredPoles1 = [-1, -2]; % Adjust these poles as needed

K1 = acker(A1, B1, desiredPoles1);

disp('State feedback gains for System 1:');

disp(K1);

disp('These state feedback gains place System 1 poles at:');

disp(desiredPoles1)

else

fprintf("System 1 cannot be stabilized by a static state-feedback control law")

end

if(rank(R2)==size(R2,2))

fprintf("System 2 can be stabilized by a static state-feedback control law")

% If stabilizable, find state feedback gains

desiredPoles2 = [-1, -2]; % You can adjust these poles as needed

K2 = acker(A2, B2, desiredPoles2);

disp('State feedback gains for System 2:');

disp(K2);

disp('These state feedback gains place System 2 poles at:');

disp(desiredPoles2)

else

fprintf("System 2 cannot be stabilized by a static state-feedback control law")

end

# **OUTPUT:**

System 1 cannot be stabilized by a static state-feedback control law

System 2 can be stabilized by a static state-feedback control law

State feedback gains for System 2:

5 1

These state feedback gains place System 2 poles at:

-1 -2

# **SCREENSHOT:**

