CODE:

```
% Clear workspace
close all
clear
clc


% Add parser and solver to path
addpath(genpath('C:\Users\tsamak\Downloads\MathWorks\Toolboxes\archives\required\
YALMIP'))
addpath(genpath('C:\Users\tsamak\Downloads\MathWorks\Toolboxes\archives\required\
SeDuMi'))


% Define the system matrices
A1 = [-4, 1; 0, 2];
B1 = [1; 0];
A2 = [-3, 2; 4, 1];
B2 = [0; 1];


% Define decision variables
n = size(A1, 1); % Number of states
P1 = sdpvar(n, n);
P2 = sdpvar(n, n);
Z1 = sdpvar(1, n);
Z2 = sdpvar(1, n);


% Define the LMI constraints for SYS1
Constraints1 = [P1 >= 0.001*eye(n), A1*P1 + P1*A1' + B1*Z1 + Z1'*B1' <= 0];


% Define the LMI constraints for SYS2
Constraints2 = [P2 >= 0.001*eye(n), A2*P2 + P2*A2' + B2*Z2 + Z2'*B2' <= 0];


% Solve the LMI for SYS1
options = sdpsettings('verbose', 0);
sol1 = optimize(Constraints1, [], options);


% Solve the LMI for SYS2
sol2 = optimize(Constraints2, [], options);


% Check the feasibility of the LMIs and compute Z1 and Z2 if feasible
```

```
if sol1.problem == 0
    disp('SYS1 is stabilizable.');
    % Compute stabilizing control gain
    K1 = value(Z1)/value(P1);
    disp('Stabilizing control gain for SYS1:');
    disp(K1);
    % Verify stabilizing control gain
    disp('Verifying stabilizing control gain for SYS1...');
    Acl1 = A1+B1*K1;
    eigAcl1 = real(eig(Acl1));
    disp('Eigen values (real parts) for closed loop SYS1:');
    disp(eigAcl1);
    if eigAcl1 <= 0
        disp('Verification successful!')
    else
        disp('Verification failed!')
    end
else
    disp('SYS1 is not stabilizable.');
end


if sol2.problem == 0
    disp('SYS2 is stabilizable.');
    % Compute stabilizing control gain
    K2 = value(Z2)/value(P2);
    disp('Stabilizing control gain for SYS2:');
    disp(K2);
    % Verify stabilizing control gain
    disp('Verifying stabilizing control gain for SYS2...');
    Acl2 = A2+B2*K2;
    eigAcl2 = real(eig(Acl2));
    disp('Eigen values (real parts) for closed loop SYS2:');
    disp(eigAcl2);
    if eigAcl2 <= 0
        disp('Verification successful!')
    else
        disp('Verification failed!')
    end
else
    disp('SYS2 is not stabilizable.');
end
```

OUTPUT:

```
SYS1 is not stabilizable.
SYS2 is stabilizable.
Stabilizing control gain for SYS2:
    -7.8742   -0.6528
Verifying stabilizing control gain for SYS2...
Eigen values (real parts) for closed loop SYS2:
    -1.3264
    -1.3264
Verification successful!
```

SCREENSHOT: