**%% code for Problem 4**

global A;

global B;

global K;

global F;

A = [0 1; 0 0];

B = [0; 1];

Q = [1 0; 0 1];

R = 1;

% solve Riccati equation solution

[K,P,E] = lqr(A,B,Q,R)

F = inv(R)\*transpose(B)\*P

x0 = [10 10];

t0 = 0; tf = 20;

[T,x] = ode23('xdot', [t0,tf], x0)

plot(T, x(:,1), T, x(:,2), '--', 'LineWidth',2)

title('State and velocity over time with Q = [1 0; 0 1], R = 1')

legend('state','velocity')

% compute xdot

function [xdot] = xdot(t,x)

global A;

global B;

global F;

xdot = (A-B\*F)\*(x-[4;0]);

