clear

m = 100;   % mass of box
k = 1000;  % spring constant
c = 20;    % damping coefficient
L = 2;     % position of top of spring when r(t) = 0 and spring relaxed
dt = 0.001;
n=10000;

% program a bump in the road
r=zeros(n+1,1);
for i=3001:3500     % that happens at t=3, and lasts 0.5 seconds
    r(i) = 0.1;       % with height = 10cm
end

p(1) = 1;   % starting height of box, at equilibrium positon
v(1) = 0;   % starting velocity of box
t(1) = 0;

for i=2:n+1
    t(i) = t(i - 1) + dt;
    p(i) = p(i-1)+v(i-1)*dt;
    vr = (r(i) - r(i-1))/dt;   % estimate r' at t(i - 1)

    a = (-k*(p(i-1) - r(i-1) - L) - c*(v(i-1) - vr))/m - 10;
    v(i) = v(i-1) + a*dt;
end

plot(t, p)