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## HW1 Problem 1

```
clear all;
k=10; %stifness coefficient
l=2; % initial length
m=5; % mass
% m2=5;
x=3.5; % initial deflection of the spring
p=10; % initial deflection angle of the spring
g=9.81; % gravitational acceleration
y10=[p/360*2*pi 0 x 0]; % Initial Conditions X=[ x1 x1' theta theta']

tspan=[linspace(0,40,201)]; % Duration
f=@(t,y) [y(2) ; ...
          (-2*m*(1+y(3))*y(4)*y(2)-m*g*(1+y(3))*sin(y(1)))/(m*(1+y(3))^2); ...
          y(4) ; ...
          (1+y(3))*m*y(2)^2+m*g*cos(y(1))-k*y(3))/m];

[t,y]=ode45(f,tspan,y10);

x2=(1+y(:,3)).*sin(y(:,1));
y2=(1+y(:,3)).*cos(y(:,1));

for k=1:1:1
    figure(1)
    for i=1:1:length(t)
        hold on;
        axis([-12 12 -12 12]);

        title('Spring Pendulum');
        plot( [0 x2(i) ],-[0 y2(i)] , 'k -');

        plot(x2(1:i),-y2(1:i), 'b :');

        plot(x2(i),-y2(i), 'r o'); % massenpunkt m2
        plot([-5 5],[0 0], 'k -');
        plot(x2(i),-y2(i), 'r o');
        if i==length(t)
            break
        end
        drawnow;
        clf;
    end
    hold off
end
```

## Spring Pendulum

