HOMEWORK 7, Due date 4/3 (you can always hand it in early!)

1. A mass of 10 kg falls 50 cm onto a platform of spring scale, and sticks. The platform eventually comes to rest 10 cm below its initial position. The mass of the platform is 2 kg.

a) find the spring constant.

b) It is desired to put in a damping system so that the scale comes to rest in a minimum time (critical damping). Find the necessary damping constant,β, and the equation of motion of the platform after the mass hits.

2. In an undamped free harmonic oscillator, the motion is given by $x = A \sin \omega_0 t$. The displacement is maximum exactly midway between the zero crossings. In an under-damped oscillator the motion is no longer exactly sinusoidal, and the maximum is advanced before the midpoint of the zero crossings. Show that the maximum is advanced by a phase angle, ϕ, given (for low damping) by $\phi=\beta/\omega_0$.