Due October 25 at the start of Lab time.

Show all steps, and use the laplace transform to find the solution of

$$m\frac{d^2x(t)}{dt^2} + kx(t) = f(t), \quad x(0) = \frac{dx(0)}{dt} = 0$$

where m and k are positive constants and f(t) is given below. Let $\omega_0^2 = k/m$.

1. $f(t) = I\delta(t)$.

2. $f(t) = A\sin(\omega t)$. Describe the solution for $\omega \neq \omega_0$ and when $\omega = \omega_0$.

3. $f(t) = A\cos(\omega_0 t)$

4. $f(t) = A, 0 < t < t_0$ and $f(t) = 0, t \geq t_0$

You may use information from a laplace transform table.