Please write legibly and show all work. If the answer to a problem is written down correctly, but certain steps of solving it are not shown, points might be taken off.

1. Use the method of variation of parameters to find the general solution for:

   (a) $y'' + 16y = 3\sec(4t)$

   (b) $y'' - 5y = te^t$

2. This problem is about an RLC circuit, which involves a resistor (of resistance R ohms), an inductor (of L henries), and a capacitor (of C farads). There is also a voltage source (such as a battery) providing $E(t)$ volts at time t.
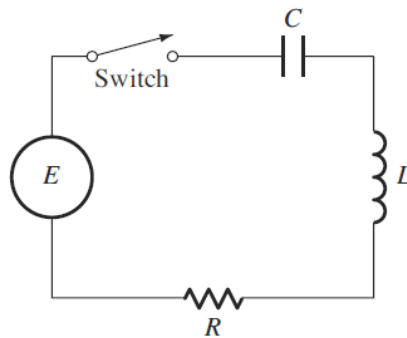
When the switch is closed there is a current of $I(t)$ amperes. With the help of Kirchhoff's laws one can derive an ODE for $I = I(t)$:

$$LI'' + RI' + \frac{1}{C}I = E'(t)$$

(See §3.7 of the textbook for more details, if you are interested.) Thus $I(t)$ satisfies the same kind of equation as the position of a mass in a spring system.

Suppose the RLC circuit has $R = 16$, $L = 2$, $C = 0.01$, $E(t) = 100$. Find the general solution for the current at time t.