1. (6) For each of the following differential equations, what functional form will a particular solution have? Do not find a particular solution, just the form you should use to find a particular solution.

(a) \( \frac{d^2y}{dt^2} + 4y = t^2 + e^{-2t} \)

(b) \( \frac{d^2y}{dt^2} - y = e^{-t} - 3\sin(t) \)

(c) \( \frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 9y = e^{-t} + te^{-3t} + \sin(t) + \sin(3t) \).

2. (4) By pencil and paper, i.e., show your work, solve the initial value problem below. You may not use Maple or the Laplace transform to solve this problem.

\[ \frac{d^2y}{dt^2} + \frac{dy}{dt} + 4y = f(t), \quad y(0) = 0, \ y'(0) = 0, \]

where \( f(t) = \begin{cases} 1, & 0 \leq t \leq 1 \\ 0, & 1 < t \end{cases} \).