1. Find the solution to the given initial value problem.

(a) 
$$y'' + 4y = t^2 + 3e^t$$
,  $y(0) = 0$ ,  $y'(0) = 2$ .

$$y(0) = 0, \quad y'(0) = 2$$

(b) 
$$y'' + 4y = 3\sin 2t$$
,  $y(0) = 2$ ,  $y'(0) = -1$ .

(c) 
$$y'' + 2y' + 5y = 4e^{-t}\cos 2t$$
  $y(0) = 1, y'(0) = 0.$ 

2. Determine a suitable form for y(t) if the method of undetermined coefficients is to be used

(a) 
$$y'' + 3y' = 2t^4 + t^2e^{-3t} + \sin 3t$$
.

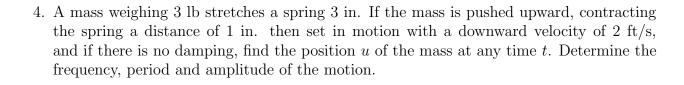
(b) 
$$y'' + 4y = t^2 \sin 2t + (6t + 7) \cos 2t$$
.

(c) 
$$y'' + 2y' + 2y = 3e^{-t} + 2e^{-t}\cos t + 4t^2e^{-t}\sin t$$
.

- 3. Use the method of variation of parameters to find a particular solution to
  - (a)  $y'' + y = \tan x$ .

(b) 
$$y'' + 4y' + 4y = t^{-2}e^{-2t}$$
.

(c) 
$$y'' - 2y' + y = \frac{e^t}{(1+t^2)}$$
.



5. A series circuit has a capacitor of  $10^{-5}$  F, a resistor of  $3 \times 10^2$   $\Omega$ , and an inductor of 0.2 H. The initial charge of the capacitor is  $10^{-6}$  C and there is no initial current. Find the charge Q on the capacitor at any time t.

6. A mass of 4 lb stretches a spring 1.5 in. The mass is displaced 2 in. in the positive direction from its equilibrium position and released with no initial velocity. Assuming that there is no damping and that the mass is acted on by an external force of  $2\cos 3t$  lb, formulate the initial value problem describing the motion of the mass.