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Question 3

$$10y''(t) - 10y'(t) + 4y(t) = 0$$

Char eqn. $r^2 - r + \frac{1}{4} = 0$

$$\frac{1 \pm \sqrt{1 - 36}}{2} = r$$

$$r = \frac{1 \pm \sqrt{35}i}{2}$$

$$a = \frac{1}{2} \quad B = \frac{\sqrt{35}}{2}$$

$$e^{at} (\cos(Bt) + i \sin(Bt))$$

$$y(t) = k_1 e^{\frac{1}{2}at} \cos\left(\frac{\sqrt{35}}{2}t\right) + k_2 e^{\frac{1}{2}at} \sin\left(\frac{\sqrt{35}}{2}t\right)$$

$$y(0) = 0 = k_1(1) \quad k_1 = 0$$

$$y'(t) = 0 = k_2(1) \quad k_2 = 0 \quad y(t) = 0$$

$$y'(t) = -k_1 e^{\frac{1}{2}at} \sin\left(\frac{\sqrt{35}}{2}t\right) + k_2 e^{\frac{1}{2}at} \cos\left(\frac{\sqrt{35}}{2}t\right)$$