MATH 246 Homework 2.9b
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Directions:

- Work should be done neatly and on separate paper.
- Enough work must be shown so that the steps you are taking is clear.

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1. Solve the initial value problem:

$$y'' - 2y' - 3y = 0 \quad \text{with} \quad y(0) = -2 \text{ and } y'(0) = 1$$

2. Solve the initial value problem:

$$y'' + y' + 2y = t \quad \text{with} \quad y(0) = 0 \text{ and } y'(0) = 7$$

3. Define the function:

$$f(t) = \begin{cases} 0 & \text{for } t < 3 \\ t - 3 & \text{for } t \geq 3 \end{cases}$$

   Solve the initial value problem:

$$y' + 2y = f(t) \quad \text{with} \quad y(0) = 2$$

4. Define the function:

$$f(t) = \begin{cases} 0 & \text{for } t < 42 \\ 2 & \text{for } t \geq 42 \end{cases}$$

   Solve the initial value problem:

$$y'' - 2y' - 3y = f(t) \quad \text{with} \quad y(0) = 2 \text{ and } y'(0) = 1$$

5. Define the function:

$$f(t) = \begin{cases} 0 & \text{for } t < 42 \\ 2 & \text{for } t \geq 42 \end{cases}$$

   Solve the initial value problem:

$$y'' - 2y' + 3y = f(t) \quad \text{with} \quad y(0) = 2 \text{ and } y'(0) = 1$$

   Note: The only difference between this problem and the previous problem is the $+3y$ instead of the $-3y$ but it has a significant effect on the solution.