

6.4: Solving ODEs with Step Functions

Prep Work Examples:

$y'' + 4y = g(t)$, $y(0) = 0$, $y'(0) = 0$, where

$$g(t) = u_5(t) = \begin{cases} 0 & \text{if } 0 \leq t < 5 \\ 1 & \text{if } t \geq 5 \end{cases}$$

$y'' + 2y' + 10y = g(t)$, $y(0) = 0$, $y'(0) = 0$, where

$$g(t) = u_5(t) - u_{10}(t) = \begin{cases} 0 & \text{if } 0 \leq t < 5 \\ 1 & \text{if } 5 \leq t \leq 10 \\ 0 & \text{if } t > 10 \end{cases}$$

Solve the IVP $y'' + y = g(t)$, $y(0) = 1$, $y'(0) = 0$

Where

$$g(t) = \begin{cases} t & \text{if } 0 \leq t < 1 \\ 1 & \text{if } t \geq 1 \end{cases}$$