

5.1 1. $y'' - 5y' + 4y = f(t)$
 $y(0) = 1, y'(0) = 1$

$$f(t) = \begin{cases} 1, & 0 \leq t < 4 \\ 0, & t \geq 4 \end{cases}$$

5.2 2. $y'' - 6y' + 9y = f(t)$
 $y(0) = 1, y'(0) = 2$

$$f(t) = \begin{cases} 0, & 0 \leq t < 1 \\ 1, & 1 \leq t < 3 \\ 0, & t \geq 3 \end{cases}$$

5.7 3. $y'' + 3y' + 2y = f(t)$
 $y(0) = 0, y'(0) = -1$

$$f(t) = \begin{cases} t, & 0 \leq t < 3 \\ 6-t, & 3 \leq t < 6 \\ 0, & t \geq 6 \end{cases}$$

5.10 4. $y'' - y' = f(t)$
 $y(0) = 0, y'(0) = 0$

$$f(t) = \begin{cases} 0, & 0 \leq t < 2 \\ t-2, & t \geq 2 \end{cases}$$

5.11 5. $y'' - y' - 2y = f(t)$
 $y(0) = 1, y'(0) = 0$

$$f(t) = \begin{cases} e^t, & 0 \leq t < 1 \\ 0, & t \geq 1 \end{cases}$$

5.16 6. $y'' - 2y' + y = f(t)$
 $y(0) = 1, y'(0) = -1$

$$f(t) = \begin{cases} 1, & 0 \leq t < 1 \\ e^{t-1}, & t \geq 1 \end{cases}$$

$$7. \quad y'' - 4y' + 4y = f(t)$$

$$5.18 \quad y(0) = 0, \quad y'(0) = 2$$

$$f(t) = \begin{cases} 0, & 0 \leq t < \pi \\ \cos t, & t \geq \pi \end{cases}$$

$$8. \quad y'' + y = \delta(t - 2\pi)$$

$$5.22 \quad y(0) = 1, \quad y'(0) = 0$$

$$9. \quad y'' + 10y' + 25y = \delta(t - 5)$$

$$5.24 \quad y(0) = 1, \quad y'(0) = -1$$

$$10. \quad y'' - y' - 6y = f(t)$$

$$5.17 \quad y(0) = 2, \quad y'(0) = 0$$

$$f(t) = \begin{cases} \sin t, & 0 \leq t < 2\pi \\ 0, & t \geq 2\pi \end{cases}$$

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$$1. y(t) = \frac{1}{4} + \frac{2}{3} e^t + \frac{1}{12} e^{4t} - u_4 \left(\frac{1}{4} - \frac{1}{3} e^{t-4} + \frac{1}{12} e^{4(t-4)} \right)$$

$$2. y(t) = 2te^t + u_1 \left(\frac{1}{9} - \frac{1}{9} e^{3(t-1)} + \frac{1}{3} (t-1) e^{3(t-1)} \right)$$

$$3. y(t) = -\frac{3}{4} + \frac{1}{2} t + \frac{3}{4} e^{-2t} - u_3 \left(t - \frac{9}{2} + 2e^{-(t-3)} - \frac{1}{2} e^{-2(t-3)} \right) - u_6 \left(\frac{1}{2} t - \frac{15}{4} + e^{-(t-6)} - \frac{1}{4} e^{-2(t-6)} \right)$$

$$4. y(t) = u_2 \left(-1 + t - \frac{1}{2} t^2 + e^{t-2} \right)$$

$$5. y(t) = -\frac{1}{2} e^t + \frac{5}{6} e^{-t} + \frac{2}{3} e^{2t} - e u_1 \left(-\frac{1}{2} e^{t-1} + \frac{1}{6} e^{-(t-1)} + \frac{1}{3} e^{2(t-1)} \right)$$

$$6. y(t) = 1 - te^t - u_1 \left(1 - e^{t-1} + (t-1) e^{t-1} \right) + \frac{1}{2} u_1 \left((t-1)^2 e^{t-1} \right)$$

$$7. y(t) = 2t e^{2t} - u_{\pi} \left(-\frac{3}{25} e^{2(t-\pi)} + \frac{2}{5} (t-\pi) e^{2(t-\pi)} - \frac{3}{25} \cos t + \frac{4}{25} \sin t \right)$$

$$8. y(t) = \cos t + u_{2\pi} \sin t$$

$$9. y(t) = e^{-5t} + 4t e^{-5t} + u_5(t-5) \left(e^{-5(t-5)} \right)$$

$$10. y(t) = \frac{41}{50} e^{3t} + \frac{29}{25} e^{-2t} + \frac{1}{50} \cos t - \frac{7}{50} \sin t$$