Student question WeBWorK Assign8 question 10

Wednesday, March 31, 2021 6:50 PM

$$Y(s) = \frac{12e^{-3s}}{s(s+3)} - \frac{12e^{-6s}}{s(s+3)} + \frac{5}{s+3}$$

then use partial fractions to find that

$$\frac{1}{s(s+3)} = \frac{1}{3s} - \frac{1}{3(s+3)}$$

so $Y(s) = 12e^{-3s}\left(\frac{1}{3s} - \frac{1}{3(s+3)}\right) - 12e^{-6s}\left(\frac{1}{3s} - \frac{1}{3(s+3)}\right) + \frac{5}{s+3}$

$$= \frac{12e^{-3s}}{3s} - \frac{12e^{-3s}}{3(s+3)} - \frac{12e^{-6s}}{3s} + \frac{12e^{-6s}}{3(s+3)} + \frac{5}{s+3}$$

use $\mathcal{L}^{-1}\left\{\frac{e^{-as}}{s}\right\} = u(t-a)$

use $\mathcal{L}^{-1}\left\{\frac{1}{s-a}\right\} = e^{at}$

use $\mathcal{L}^{-1}\left\{e^{-as}F(s)\right\} = f(t-a)\,u(t-a)$

with $F(s) = \frac{1}{s+3}$

(1 point) Find the Laplace transform of

$$f(t) = \begin{cases} 0, & t < 5 \\ t^2 - 10t + 27, & t \geq 5 \end{cases}$$

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$$f(t) = (t^2 - 10t + 27)\,u(t-5)$$

$$\mathcal{L}\{f(t)\,\mathcal{U}(t-a)\} = e^{-as}\,\mathcal{L}\{f(t+a)\}$$

$t^2-10t+27$ $\qquad e^{-5s}\,\mathcal{L}\{(t+5)^2-10(t+5)+27\}$

$$\mathcal{L}\{\cancel{f(t-a)}\,\mathcal{U}(t-a)\} = \cancel{e}^{-as}\,F(s)$$

$\cancel{(t-5)^2+2}$

(1 point) Consider the initial value problem

$$y' + 6y = \begin{cases} 0 & \text{if } 0 \le t < 2 \\ 12 & \text{if } 2 \le t < 7 \\ 0 & \text{if } 7 \le t < \infty, \end{cases} \qquad y(0) = 8.$$

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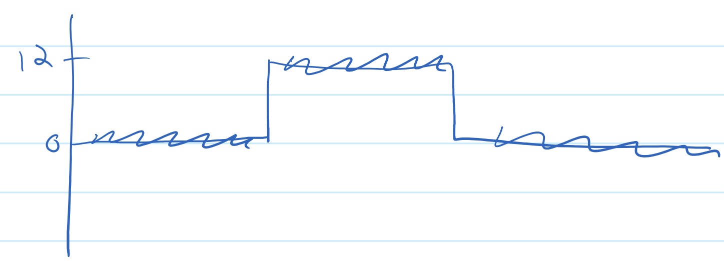
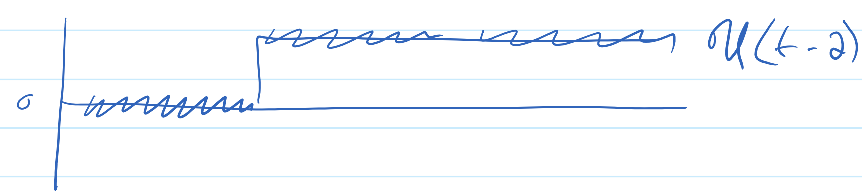
$$y' + 6y = 12\,[\mathcal{U}(t-2) - \mathcal{U}(t-7)]$$





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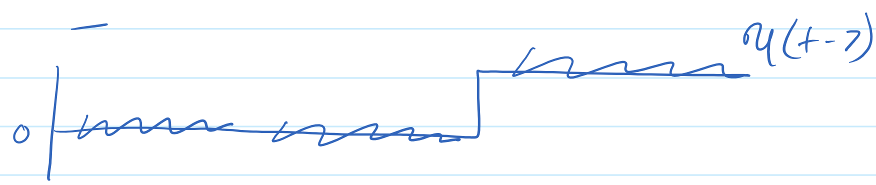

$$y' + 6y = 12\,[\mathcal{U}(t-2) - \mathcal{U}(t-7)]$$

$$sY(s) - \cancel{y(0)}^{\,8} + 6Y(s) = 12\,\frac{e^{-2s}}{s} - 12\,\frac{e^{-7s}}{s}$$

$\mathcal{L}$ | $\mathcal{L}^{-1}$

$u(t-a)$	$\frac{e^{-as}}{s}$

$$(s+6)\,Y(s) = \frac{12e^{-2s}}{s} - \frac{12e^{-7s}}{s} + 8$$