

ENGR 3323: Signals and Systems

HW 5_Ch4 Answer Keys

1)

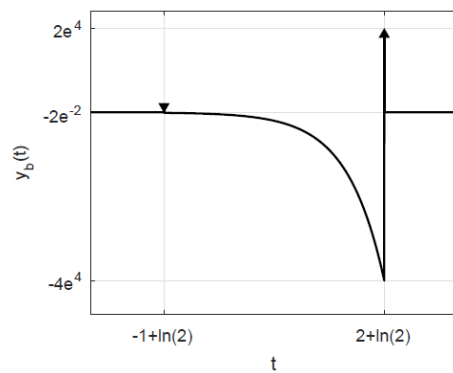
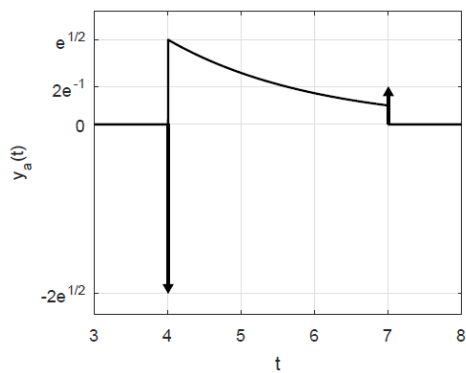
a) $\frac{1}{s}[1 - e^{-s}]$ b) $\frac{1}{(s+1)^2}, \text{Re}(s) > -1$ c) $\frac{1}{s+2}e^{-5(s+2)} + e^{-s}, \text{Re}(s) > -2$

2) Find the inverse (unilateral) Laplace transform of the following functions:

a) $x(t) = (e^{-2t} + e^{-3t})u(t)$ b) $x(t) = 3.018e^{-2t} \cos(3t + 6.34^\circ)u(t)$
 c) $x(t) = [2 - (2+t)e^{-t}]u(t)$ d) $x(t) = \delta(t) + (3.2e^{3t} - 0.2e^{-2t})u(t)$

3)

a) $Y_a(s) = se^{-5s}X(s + \frac{1}{2}) \iff \frac{d}{dt} \{e^{-(t-5)/2}x(t-5)\}$
 $y_a(t) = -e^{-(t-5)/2} [u(t-7) - u(t-4)] + 2e^{-1}\delta(t-7) - 2e^{1/2}\delta(t-4)$
 b) $y_b(t) = 4e^{2(t-\ln(2))} [u(t-2-\ln(2)) - u(t+1-\ln(2))] + 2e^4\delta(t-2-\ln(2)) - 2e^{-2}\delta(t+1-\ln(2))$



4)

a) $X(s) = \frac{1}{s^2} - \frac{1}{s^2}e^{-s} - \frac{1}{s}e^{-s}$ b) $X(s) = \frac{1}{s^2+1}(1 + e^{-\pi s})$ c) $X(s) = \frac{1}{es^2}(1 - e^{-s} - se^{-s}) + \frac{e^{-s}}{e(s+1)}$

5)

a) $\mathcal{L}[tx(t)] = -\frac{d}{ds}X(s)$ b) $Y(s) = \frac{1}{s}$ c) $X(s) = -\ln(s)$