Solution to ECE Test #5 S07 #1

Find the numerical values of the constants.

1. $$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{3s(s-3)}{s^2+4s+3}$$

$$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{3s^2-9s}{s^2+4s+3}=3-\frac{21s+9}{s^2+4s+3}=3-\left[\frac{27}{s+3}-\frac{6}{s+1}\right]$$

$$3\delta(t)-\left[27e^{-3t}-6e^{-t}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}=3-\left[\frac{27}{s+3}-\frac{6}{s+1}\right]$$

$A = 3$, $B = -27$, $b = 3$, $C = 6$, $c = 1$

2. $$\left[At+B+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{1}{s^2(s+8)}$$

$$\left[\frac{1}{8}t-\frac{1}{64}+\frac{1}{64}e^{-8t}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{1/8}{s^2}-\frac{1/64}{s}+\frac{1/64}{s+8}$$

$A = 1/8=0.125$, $B = -1/64=-0.01562$, $C = 1/64=0.01562$, $c = 8$

Solution to ECE Test #5 S07 #2

Find the numerical values of the constants.

1. $$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{2s(s+4)}{s^2+4s+3}$$

$$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{2s^2+8s}{s^2+4s+3}=2-\frac{6}{s^2+4s+3}=2-\left[\frac{3}{s+1}-\frac{3}{s+3}\right]$$

$$2\delta(t)-\left[3e^{-t}-3e^{-3t}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}=2-\left[\frac{3}{s+1}-\frac{3}{s+3}\right]$$

$A = 2$, $B = -3$, $b = 1$, $C = 3$, $c = 3$

2. $$\left[At+B+Ce^{-ct}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{2}{s^2(s+5)}$$

$$\left[\frac{2}{5}t-\frac{2}{25}+\frac{2}{25}e^{-5t}\right]u(t)\overset{\mathcal{L}}{\longleftrightarrow}\frac{2/5}{s^2}-\frac{2/25}{s}+\frac{2/25}{s+5}$$

$A = 2/5=0.4$, $B = -2/25=-0.08$, $C = 2/25=0.08$, $c = 5$

Solution to ECE Test #5 S07 #3

Find the numerical values of the constants.

1. $$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\xleftrightarrow{\mathcal{L}}\frac{3s(s-7)}{s^2+6s+8}$$

$$A\delta(t)+\left[Be^{-bt}+Ce^{-ct}\right]u(t)\xleftrightarrow{\mathcal{L}}\frac{3s^2-21s}{s^2+6s+8}=3-\frac{39s+24}{s^2+6s+8}=3-\left[\frac{66}{s+4}-\frac{27}{s+2}\right]$$

$$3\delta(t)-\left[66e^{-4t}-27e^{-2t}\right]u(t)\xleftrightarrow{\mathcal{L}}=3-\left[\frac{66}{s+4}-\frac{27}{s+2}\right]$$

$A = 3$, $B = -66$, $b = 4$, $C = 27$, $c = 2$

2. $$\left[At+B+Ce^{-ct}\right]u(t)\xleftrightarrow{\mathcal{L}}\frac{-3}{s^2(s+1)}$$

$$\left[-3t+3-3e^{-t}\right]u(t)\xleftrightarrow{\mathcal{L}}-\frac{3}{s^2}+\frac{3}{s}-\frac{3}{s+1}$$

$A = -3$, $B = 3$, $C = -3$, $c = 1$