Gabriel Emerson gte0802 | HW6 | Due 2/26

Problems: 3.1(a,f), 3.3(a,c), 3.5(a,c), 3.6(a)

3.1 a) Staircase will be u(t)

$$4u(t) - 2u(t-1) - 2u(t-2)$$

$$= X_1(s) = \frac{1}{s}(4 - 2e^{-s} - 2e^{-2s})$$

3.1 f.) Triangle wave

$$-5r(t) + 10r(t-2) - 10r(t-6) + 5r(t-8)$$

$$= X(s) = \frac{1}{s^2}(-5 + 10e^{-2s} - 10e^{-6s} + 5e^{-8s})$$

3.3 a.) $x(t) = 4te^{-2t}u(t)$

$= \frac{1}{4} \cdot X(\frac{s}{4})$ ← $\quad$ → $= \frac{1}{(s+2)^2}$

$$= \frac{1}{4} \cdot \frac{1}{\frac{(s+2)^2}{4}} \Rightarrow \frac{1}{4} \cdot \frac{4}{(s+2)^2}$$

$$\Rightarrow \frac{4}{(s+2)^2}$$

3.3 c.) $x(t) = 12e^{-3(t-4)}u(t-4)$

$= e^{-4s}\left(\frac{12}{s+3}\right)$

3.5 a.) $x(t) = 16e^{-2t}\cos(4t)u(t)$

$= \left(\frac{16}{s+2}\right)\left(\frac{s}{s^2+16}\right)$

$= \frac{s}{s^2(s+2)}$

3.5 c.) $x(t) = 10e^{-3t}u(t-4)$

$= \left(\frac{e^{-4s}}{s}\right)\left(\frac{10}{s+3}\right) = \frac{10e^{-4s}}{s(s+3)}$

3.6 a.) $x(t) = 30(e^{-3t} + e^{3t})u(t)$

$\Rightarrow 30e^{-3t} + 30e^{3t}u(t)$

$\Rightarrow \frac{30}{s+3} + \frac{30}{s-3}$