

HW 8 Signals + Systems

$$\boxed{3.9} \quad X(s) = 1 + sX(s)$$

$$s \rightarrow \infty$$

$$X(\infty) = 1 + sX(s)$$

$$s \rightarrow 0$$

$$\text{So, } X(s) = \frac{4s^2 + 28s + 40}{s(s+3)(s+4)}$$

$$sX(s) = \frac{s(4s^2 + 28s + 40)}{s(s+3)(s+4)}$$

$$\text{So, } X(s) = 4 + \frac{28}{s} + \frac{40}{s^2}$$

$$s \rightarrow \infty \quad \left(1 + \frac{3}{s}\right)\left(1 + \frac{4}{s}\right)$$

$$X(0) = \frac{4+0+0}{(0+3)(0+4)} = 4$$

$$X(\infty) = 1 + sX(s)$$

$$1 + \frac{4s^2 + 28s + 40}{(s+3)(s+4)}$$

$$X(\infty) = \frac{0+0+40}{(0+3)(0+4)} = \frac{40}{12}$$

3.10 $X(s) = \frac{s^2 + 4}{2s^3 + 4s^2 + 10s}$

So, $sX(s) = \frac{s \cdot (s^2 + 4)}{2s^3 + 4s^2 + 10s}$

$= \frac{s^2 + 4}{2s^2 + 4s + 10}$

$X(0) = 1 + sX(s) = 1 + \frac{s^2 + 4}{2s^2 + 4s + 10}$

$s \rightarrow \infty \quad = 1 + \frac{1 + \frac{4}{s^2}}{2 + \frac{4}{s} + \frac{10}{s^2}}$

$= \frac{1+0}{2+0+0} \Rightarrow X(0) = \frac{1}{2}$

$X(\infty) = 1 + sX(s) = 1 + \frac{s^2 + 4}{2s^2 + 4s + 10}$

$\frac{0+4}{0+0+10} \Rightarrow X(\infty) = \frac{4}{10}$