P18: Problem 8.5 of text

(a) \( X(s) = \frac{4}{s(s+1)} \)

\[
\lim_{t \to \infty} x(t) = \lim_{s \to 0} sX(s) = \lim_{s \to 0} \frac{4}{s+1} = 4
\]

(b) \( X(s) = \frac{3s+4}{s(s+1)} \)

\[
\lim_{t \to \infty} x(t) = \lim_{s \to 0} sX(s) = \lim_{s \to 0} \frac{3s+4}{s+1} = 4
\]

(c) \( X(s) = \frac{4}{s(s-1)} \)

Poles are at \( s = 0, 1 \)

Pole at \( s = 1 \) implies that \( x(t) \) is not finite.

(d) \( X(s) = \frac{3s^2 + 4s + 1}{s^3 + 2s^2 + s + 2} \implies \text{Poles are at } -2, \pm 1\)

Poles at \( \pm 1 \) implies that \( x(t) \) does not exist.

(e) \( X(s) = \frac{3s^2 + 4s + 1}{s^3 + 3s^2 + 3s + 2} \implies \text{Poles are at } -2, -0.5 \pm 0.866\)

\[ \therefore \lim_{s \to 0} sX(s) = 0 \]

(f) \( X(s) = \frac{3s^2 + 4s + 1}{s(s^2 + 3s^2 + 3s + 2)} \)

\[ \therefore \lim_{s \to 0} sX(s) = \lim_{s \to 0} \frac{3s^2 + 4s + 1}{s^3 + 3s^2 + 3s + 2} = \frac{1}{2} \]