13.42 Find the initial and final values of the time function $f(t)$ if $\mathbf{F}(s)$ is given as

(a) $\mathbf{F}(s) = \dfrac{10(s + 2)}{(s + 1)(s + 4)}$

(b) $\mathbf{F}(s) = \dfrac{s^2 + 2s + 2}{(s + 6)(s^3 + 4s^2 + 8s + 4)}$

(c) $\mathbf{F}(s) = \dfrac{2s}{s^2 + 2s + 3}$ **PSV**

SOLUTION:

Initial values

a) $\lim\limits_{s \to \infty} sF(s) = \dfrac{10\,(\infty)^2}{\infty^2} = 10$ $\boxed{\lim\limits_{t \to 0} f(t) = 10}$

b) $\lim\limits_{s \to \infty} sF(s) = \dfrac{\infty^3}{\infty^4} = 0$ $\boxed{\lim\limits_{t \to 0} f(t) = 0}$

c) $\lim\limits_{s \to \infty} sF(s) = \dfrac{2\,(\infty)^2}{\infty^2} = 2$ $\boxed{\lim\limits_{t \to 0} f(t) = 2}$

Final value

a) $\lim\limits_{s \to 0} sF(s) = 0$ $\boxed{\lim\limits_{t \to \infty} f(t) = 0}$

b) $\lim\limits_{s \to 0} sF(s) = 0$ $\boxed{\lim\limits_{t \to \infty} f(t) = 0}$

c) $\lim\limits_{s \to 0} sF(s) = 0$ $\boxed{\lim\limits_{t \to \infty} f(t) = 0}$