13.18 Given the following functions $\mathbf{F}(s)$, find the inverse Laplace transform of each function.

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

(b) $\mathbf{F}(s) = \dfrac{s+1}{s(s^2+4s+5)}$

SOLUTION:

a) $F(s) = \dfrac{K_1}{s+1-j1} + \dfrac{K_1^*}{s+1+j1}$ $\quad K_1 = \dfrac{10(-1+j1+1)}{j2} = 5 \Rightarrow K_1^* = 5$

$$f(t) = [10e^{-t}\cos(t)]u(t)$$

b) $F(s) = \dfrac{K_1}{s} + \dfrac{K_2}{s+2-j1} + \dfrac{K_2^*}{s+2+j1}$ $\quad K_1 = \dfrac{1}{5} = 0.2$

$$K_2 = \frac{-2+j1+1}{(-2+j1)(j2)} = \frac{-1+j1}{-2-j4} = 0.31\angle -108^\circ$$

$$f(t) = [0.2 + 0.62e^{-2t}\cos(t - 108^\circ)]u(t)$$