

13.24 Given the following functions $F(s)$, find $f(t)$.

$$(a) \quad F(s) = \frac{s + 4}{(s + 2)^2}$$

$$(b) \quad F(s) = \frac{s + 6}{s(s + 1)^2}$$

SOLUTION:

$$a) \quad F(s) = \frac{k_1}{(s+2)^2} + \frac{k_2}{s+2} \quad k_1 = 2$$

$$\text{let } s = -1, \quad F(-1) = \frac{3}{1} = \frac{2}{1} + k_2 \Rightarrow k_2 = 1$$

$$F(s) = \frac{2}{(s+2)^2} + \frac{1}{s+2} \Rightarrow \boxed{f(t) = [e^{-2t}(2t+1)]u(t)}$$

$$b) \quad F(s) = \frac{k_1}{s} + \frac{k_2}{(s+1)^2} + \frac{k_3}{s+1} \quad k_1 = 6 \quad k_2 = \frac{5}{-1} = -5$$

$$\text{let } s = -2; \quad F(-2) = \frac{4}{(-2)(-1)^2} = -\frac{6}{2} - \frac{5}{(1)^2} - k_3 = -6$$

$$F(s) = \frac{6}{s} - \frac{5}{(s+1)^2} - \frac{6}{s+1} \Rightarrow \boxed{f(t) = [6 - 5te^{-t} - 6e^{-t}]u(t)}$$