2.9.4 For each F(s) find the corresponding time function

1 $F(s) = \frac{10(s+5)}{s(s+10)}$

$= \frac{5}{s} + \frac{5}{s+10}$

$f(t) = 5\mathbb{1}(t) + 5e^{-10t} = 5 + 5e^{-10t}$

3. $F(s) = \frac{25}{s(s^2+6s+25)} = \frac{25}{s(s+3-j4)(s+3+j4)}$

$= \frac{A}{s} + \frac{M}{s+3-j4} + \frac{M^*}{s+3+j4}$

$A = sF(s)\Big|_{s=0} = \frac{25}{s^2+6s+25}\Big|_{s=0} = 1$

$M = (s+3-j4)F(s)\Big|_{s=-3+j4} = \frac{25}{s(s+3+j4)}\Big|_{s=-3+j4} = -\frac{1}{2} + \frac{3}{8}j = \frac{5}{8}\angle 2.4981 \text{ r.}$

$F(s) = \frac{1}{s} + \frac{\frac{5}{8}e^{j2.4981}}{s+3-j4} + \frac{\frac{5}{8}e^{-j2.4981}}{s+3+j4}$

$f(t) = 1(t) + 2\times\frac{5}{8}e^{-3t}\cos(4t+2.4981) = 1(t) + \frac{5}{4}e^{-3t}\cos(4t+2.4981)$

5 $F(s) = \frac{5(s+1)}{(s+2)(s+3)} = \frac{A}{s+2} + \frac{B}{s+3}$

$A = (s+2)F(s)\Big|_{s=-2} = \frac{5(s+1)}{s+3}\Big|_{s=-2} = \frac{5(-2+1)}{-2+3} = -5$

$B = (s+3)F(s)\Big|_{s=-3} = \frac{5(s+1)}{s+2}\Big|_{s=-3} = \frac{5(-3+1)}{-3+2} = 10$

$F(s) = \frac{-5}{s+2} + \frac{10}{s+3}$

$f(t) = -5e^{-2t} + 10e^{-3t}$