Problem S4.9

Obtain the inverse Laplace transform of $\dfrac{s+1}{s(s+3)(s+2)}$

Solution:

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

$$A = s\frac{s+1}{s(s+3)(s+2)}\bigg|_{s=0} = \frac{1}{6}$$

$$B = (s+3)\frac{s+1}{s(s+3)(s+2)}\bigg|_{s=-3} = \frac{s+1}{s(s+2)}\bigg|_{s=-3} = -\frac{2}{3}$$

$$C = (s+2)\frac{s+1}{s(s+3)(s+2)}\bigg|_{s=-2} = \frac{s+1}{s(s+3)}\bigg|_{s=-2} = \frac{1}{2}$$

$$f(t) = \frac{1}{6} - \frac{2}{3}e^{-3t} + \frac{1}{2}e^{-2t}$$