Problem S4.7

Obtain the inverse Laplace transform of $F(s) = \dfrac{2s^2 + s + 5}{s(s+1)}$

Solution:

Using long division one can express $F(s) = \dfrac{2s^2 + s + 5}{s(s+1)}$ as

$$F(s) = \frac{2s^2 + s + 5}{s(s+1)} = 2 + \frac{-s+5}{s(s+1)}.$$

The strictly proper part has two distinct poles and F(s) can be expressed as

$$F(s) = 2 + \frac{5}{s} + \frac{-6}{s+1}$$

The inverse Laplace transform is $f(t) = 2\delta(t) + 5 - 6e^{-t}$