Problem S4.4

Obtain the inverse Laplace transform of $F(s)=\dfrac{s+1}{s^2+4s+13}$

Solution:

F(s) has complex conjugate poles. We apply completing the square to denominator

$$F(s)=\frac{s+1}{s^2+4s+13}=\frac{s+1}{(s^2+4s+4)+9}=\frac{s+1}{(s+2)^2+3^2}=\frac{s+2}{(s+2)^2+3^2}+\frac{-1}{(s+2)^2+3^2}$$

$$F(s)=\frac{s+2}{(s+2)^2+3^2}+\frac{-1}{3}\frac{3}{(s+2)^2+3^2}$$

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