Laplace Transforms Revisited

Example: $f(t) = \cos t$

$$\begin{aligned}
\mathscr{L}\{\cos t\} &= \frac{1}{2}\mathscr{L}\{e^{jt}\} + \frac{1}{2}\mathscr{L}\{e^{-jt}\} \\
&= \frac{1}{2}\left(-\frac{1}{j-s} + \frac{1}{j+s}\right) \\
&= \frac{1}{2}\left(\frac{-\cancel{j} - s + \cancel{j} - s}{(j-s)(j+s)}\right) \\
&= \frac{1}{2}\left(\frac{-2s}{-1 + \cancel{js} - \cancel{js} - s^2}\right) \\
&= \frac{s}{s^2+1} \qquad (\text{poles at } s = \pm j)
\end{aligned}$$

for $\mathrm{Re}(s) > 0$