

Encontrar a transformada de Laplace de  $f(t) = \cos t$ .

$$\begin{aligned}\mathcal{L}\{f(t)\} &= \int_0^{+\infty} f(t)e^{-st} dt = \int_0^{+\infty} e^{-st} \cos t dt = (e^{-st} \sin t)|_0^{+\infty} + s \int_0^{+\infty} e^{-st} \sin t dt = \\ &= (e^{-st} \sin t)|_0^{+\infty} - (se^{-st} \cos t)|_0^{+\infty} - s^2 \underbrace{\int_0^{+\infty} e^{-st} \cos t dt}_{\mathcal{L}\{\cos t\}}\end{aligned}$$




$$\mathcal{L}\{\cos t\} = \frac{(e^{-st} \sin t)|_0^{+\infty} - (se^{-st} \cos t)|_0^{+\infty}}{1 + s^2}, \text{ que converge para } s > 0.$$

$$\mathcal{L}\{\cos t\} = \frac{s}{1 + s^2}, \quad s > 0$$

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