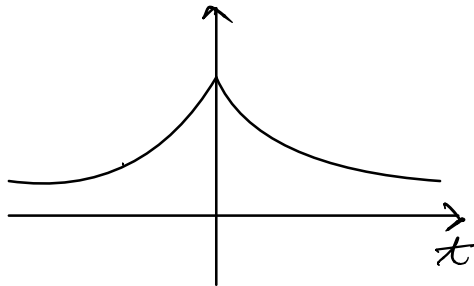


1.)

$$\begin{aligned}
 (a) \quad & (1-i) \cdot (0+2i) \\
 &= (1 \cdot 0) + (2i) - (i \cdot 0) - (i \cdot 2i) \\
 &= 0 + 2i - 0 - 2(-1) = 2i + 2 \\
 &= \underline{\underline{2(1+i)}}
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad & \frac{(0+i)}{(1-\sqrt{3}i)} \cdot \frac{(1+\sqrt{3}i)}{(1+\sqrt{3}i)} = \frac{\sqrt{3}i + i + (\sqrt{3}i)^2}{(1)^2 - (\sqrt{3}i)^2} \\
 &= \frac{-\sqrt{3} + (1+\sqrt{3})i}{1+3} = \underline{\underline{\frac{-\sqrt{3} + (1+\sqrt{3})i}{4}}}
 \end{aligned}$$

$$2) \quad f(t) = \begin{cases} e^{-t} & t \geq 0 \\ e^t & t < 0 \end{cases}$$



$$\begin{aligned}
 f(\omega) &= \int_{-\infty}^{\infty} f(t) e^{-i\omega t} dt \\
 &= \int_{-\infty}^0 e^t e^{-i\omega t} dt + \int_0^{\infty} e^{-t} e^{-i\omega t} dt \\
 &= \int_{-\infty}^0 e^{t(1-i\omega)} dt + \int_0^{\infty} e^{-t(1+i\omega)} dt
 \end{aligned}$$

$$= \left. \frac{e^{t(1-i\omega)}}{1-i\omega} \right|_0^\infty + \left. \frac{e^{-t(1+i\omega)}}{-(1+i\omega)} \right|_0^\infty$$

$$= \frac{1}{1-i\omega} - 0 + 0 - \left(-\frac{1}{(1+i\omega)} \right)$$

$$= \frac{1}{1-i\omega} + \frac{1}{1+i\omega} = \frac{(1+i\omega) + (1-i\omega)}{(1-i\omega)(1+i\omega)}$$

$$= \frac{2}{1-(-1)\omega^2} = \frac{2}{1+\omega^2}$$

$$\underline{\underline{f(u) = \frac{2}{1+\omega^2}}}$$