1.)

(a) $(1-i)\cdot(0+2i)$

$= (1\cdot 0)+(2i)-(i\cdot 0)-(i\cdot 2i)$

$= 0+2i-0-2(-1) = 2i+2$

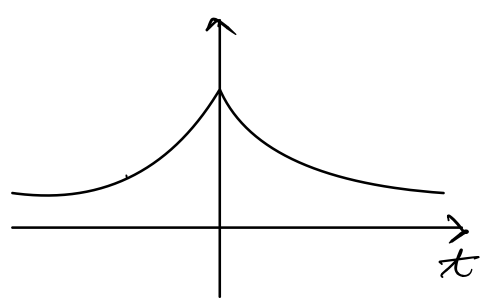
$= \underline{\underline{2(1+i)}}$

(b) $\dfrac{(0+i)}{(1-\sqrt{3}i)}\;\dfrac{(1+\sqrt{3}i)}{(1+\sqrt{3}i)} = \dfrac{\sqrt{3}i^2+i+\sqrt{3}(i)}{(1)^2-(\sqrt{3}i)^2}$

$= \dfrac{-\sqrt{3}+(1+\sqrt{3})i}{1+3} = \dfrac{-\sqrt{3}+(1+\sqrt{3})i}{\underline{\underline{4}}}$

2)

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



$$F(\omega) = \int_{-\infty}^{\infty} f(t)\, e^{-i\omega t}\, dt$$

$$= \int_{-\infty}^{0} e^{t} e^{-\omega i t} dt + \int_{0}^{\infty} e^{-t} e^{-i\omega t} dt$$

$$= \int_{-\infty}^{0} e^{t(1-i\omega)} + \int_{0}^{\infty} e^{-t(1+i\omega)} dt$$

$$= \left. \frac{e^{t(1-i\omega)}}{1-i\omega} \right|_{-\infty}^{0} + \left. \frac{e^{-t(1+i\omega)}}{-(1+\omega i)} \right|_{0}^{\infty}$$

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

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

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

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