$$|\psi\rangle = \frac{1}{2} + \frac{i}{2}|0\rangle + \frac{1}{2} - \frac{i}{2}|1\rangle$$

(2)

2.1.a

$$\langle\psi| = \left(\frac{1}{2} - \frac{i}{2}\right)\langle 0| + \frac{1}{2} + \frac{i}{2}\langle 1|$$

(b.)

$$\langle\psi|\psi\rangle =$$

$$\left[\overset{\alpha^*}{\left(\frac{1}{2} - \frac{i}{2}\right)}\langle 0| + \overset{\beta^*}{\left(\frac{1}{2} + \frac{i}{2}\right)}\langle 1|\right]\left[\overset{\alpha}{\left(\frac{1}{2} + \frac{i}{2}\right)}|0\rangle + \overset{\beta}{\left(\frac{1}{2} - \frac{i}{2}\right)}|1\rangle\right]$$

$$\frac{1}{2}\langle 0|0\rangle + 0 + 0 + \frac{1}{2}\langle 1|1\rangle = 1 \quad //$$

Calculo Auxiliar

~~$\left(\frac{1}{2} \cdot \frac{1}{2}\right) + \left(\frac{1}{2} + \frac{i}{2}\right)\left(\frac{1}{2} + \frac{i}{2}\right)$~~

$$\alpha = \frac{1}{4} + \frac{i}{2} - \frac{i}{2} - \left(\frac{i}{2}\right)^2$$

$$\alpha = \frac{1}{4} - \left(\frac{-1}{4}\right) = \frac{1}{2}$$

$$\beta = \frac{1}{4} - \left(\frac{-1}{4}\right) = \frac{1}{2}$$