

SOLUZIONE

$$\text{a) } G(s) = \frac{1}{s+1}, G(j) = \frac{1}{j+1} \Rightarrow \begin{cases} |G(j)| = \frac{1}{\sqrt{2}} \\ \arg G(j) = -\frac{\pi}{4} \end{cases}, y(t) = \frac{1}{\sqrt{2}} \sin\left(t - \frac{\pi}{4}\right) = \frac{1}{2} \sin t - \frac{1}{2} \cos t$$

$$\text{b) } \sin t = \text{Im}(e^{jt}) \Rightarrow \hat{x}(0) = \frac{1}{j+1} = \frac{1-j}{2} \Rightarrow x(0) = \text{Im}(\hat{x}(0)) = -\frac{1}{2}$$

$$\text{c) } sX(s) + \frac{1}{2} = -X(s) + \frac{1}{s^2+1} \Rightarrow (s+1)X(s) = \frac{1}{s^2+1} - \frac{1}{2} \Rightarrow X(s) = -\frac{s-1}{2(s^2+1)}$$

$$Y(s) = X(s) = \frac{-\frac{1}{2}s + \frac{1}{2}}{s^2+1} \Rightarrow y(t) = \frac{1}{2} \sin t - \frac{1}{2} \cos t$$