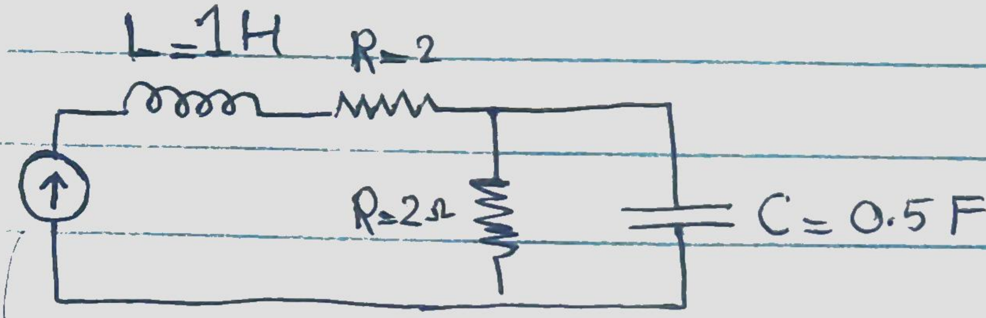


$j^2 = -1$

$\mathcal{E}(t) = 2\sin\left(2t + \frac{\pi}{4}\right)$

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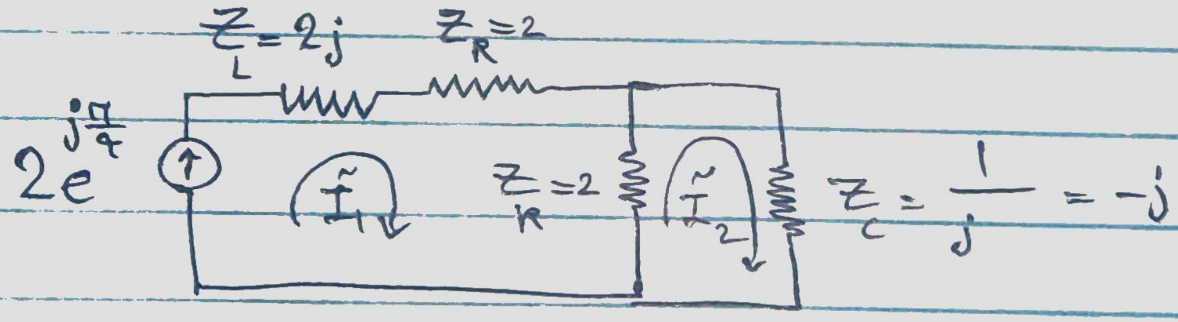
Answer: $V(t) = 2\sin\left(2t + \frac{\pi}{4}\right)$

$$\tilde{V}(t) = 2e^{j\left(2t + \frac{\pi}{4}\right)} = 2e^{j\frac{\pi}{4}} e^{j2t}$$




$$2e^{j\frac{\pi}{4}} - 2j\tilde{I}_1 - 2\tilde{I}_1 - 2(\tilde{I}_1 - \tilde{I}_2) = 0 \rightarrow$$

$$(2j + 2 + 2)\tilde{I}_1 - 2\tilde{I}_2 = 2e^{j\frac{\pi}{4}} \quad \text{Eq 1}$$

$$j\tilde{I}_2 - 2(\tilde{I}_2 - \tilde{I}_1) = 0 \rightarrow$$

$$2\tilde{I}_1 + (+j - 2)\tilde{I}_2 = 0 \quad \text{Eq 2}$$

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$$\tilde{I}_1 = \frac{\begin{vmatrix} 2e^{j\frac{\pi}{4}} & -2 \\ 0 & j-2 \end{vmatrix}}{\begin{vmatrix} 2j+4 & -2 \\ 2 & j-2 \end{vmatrix}} = \frac{2(j-2)\,e^{j\frac{\pi}{4}}}{-2 - 4j + 4j - 8 + 4}$$

$$\tilde{I}_1 = \frac{2(j-2)\,e^{j\frac{\pi}{4}}}{-6} = \left(\frac{2}{3} - \frac{1}{3}j\right) e^{j\frac{\pi}{4}}$$

$$\tilde{I}_1(t) = \left(\frac{2}{3} - \frac{1}{3}j\right) e^{j\frac{\pi}{4}}\, e^{j2t} = \left(\frac{2}{3} - \frac{1}{3}j\right) e^{j\overbrace{\left(2t+\frac{\pi}{4}\right)}^{A}}$$

$$\tilde{I}_1(t) = \left(\frac{2}{3} - \frac{1}{3}j\right)\left(\cos A + j\sin A\right)$$

$$\tilde{I}_1(t) = \frac{2}{3}\cos A + j\frac{2}{3}\sin A - j\frac{1}{3}\cos A + \frac{1}{3}\sin A$$

$$I_1(t) = \operatorname{Im}\left(\tilde{I}_1(t)\right) = \frac{2}{3}\sin A - \frac{1}{3}\cos A$$

$$I_1(t) = \frac{1}{3}\left(2\sin\left(2t+\frac{\pi}{4}\right) - \cos\left(2t+\frac{\pi}{4}\right)\right)$$