Ex:

\[ i_s(t) = 2 \sin(1kt + 135^\circ) \text{A} \]

\[ z_L = j\omega L = j1k \cdot 7 \text{m} \Omega = j7 \text{ }\Omega \]

\[ z_C = \frac{1}{j\omega C} = \frac{1}{j1k \cdot 500 \mu} \Omega = -j2 \text{ }\Omega \]

The frequency domain circuit:
b) The Thevenin equivalent voltage is the voltage at a and b for the circuit with no load attached at a and b. In this problem, we have a current source that forces $I_s$ through the 5 Ω resistor, creating a fixed value for $V_x$.

$$V_x = I_s 5 \Omega = 2e^{j45^\circ} A \cdot 5 \Omega = 10e^{j45^\circ} V$$

The wire through the middle of the circuit separates the top of the circuit from the bottom of the circuit. Thus, once we know the value for the dependent current source, we may ignore the upper half of the circuit.

For the bottom half of the circuit, we have the $2V_x$ source driving the 2 Ω and $j2$ Ω, which are in parallel. Thus, the voltage from a to b will equal the product of the $2V_x$ source value times $2 \Omega \parallel j2 \Omega$, but with a minus sign because of the direction of the dependent source's current.

$$V_{Th} = -2V_x \cdot 2 \Omega \parallel j2 \Omega = -20e^{j45^\circ} A \cdot 2 \Omega \cdot 1 \parallel j = -40e^{j45^\circ} \cdot \frac{j}{1+j}$$

or

$$V_{Th} = -40(1\angle 45^\circ) \cdot \frac{j}{\sqrt{2}\angle 45^\circ} = -j\frac{40}{\sqrt{2}}$$

To find $z_{Th}$, we may turn off the independent source, $I_s$, and look into the circuit from the a and b terminals. Note that turning off the independent source causes the dependent source to turn off, because $V_x$ will be zero.
Furthermore, nothing that can be connected to the a and b terminals will change this fact.

Looking into the circuit, only the bottom half of the circuit is seen, and this means that $z_{Th}$ is just the $2 \, \Omega \parallel j2 \, \Omega$:

$$z_{Th} = 2 \, \Omega \parallel j2 \, \Omega = 2 \, \Omega \cdot 1 \parallel j = 2 \, \Omega \cdot \frac{j}{1+j} = 2 \, \Omega \cdot \frac{1-j}{1+j} = 2 \, \Omega \cdot \frac{1+j}{2}$$

or

$$z_{Th} = 1 + j \, \Omega = \sqrt{2} \angle 45^\circ \, \Omega$$