

1.

Using superposition, find $i(t)$ Left Source

$$Z_L = j\omega L = j15$$

$$Z_C = \frac{1}{j\omega C} = \frac{1}{j1000} = -j10$$

$$Z_{eq} = (5 + j15) + 10 \parallel (-j10)$$

$$= 5 + j15 + \frac{10 \cdot (-j10)}{10 - j10} = 14.1 \angle 45^\circ$$

$$I = \frac{10}{14.1 \angle 45^\circ} = 0.7071 \angle -45^\circ$$

a) Find $i(t)$ from the left source if the right is zeroed

$$i(t) = 0.707 \cos(10t - 45^\circ) \text{ A}$$

b) Find $i(t)$ from the right source if the left is zeroed

Right Source

$$Z_L = j\omega L = 0$$

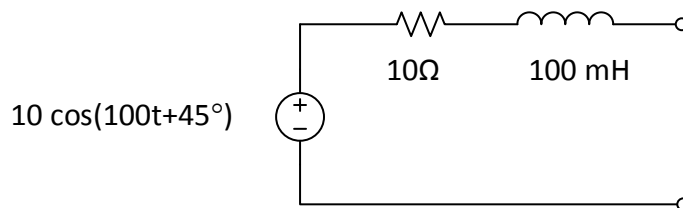
$$Z_C = \frac{1}{j\omega C} = \infty$$

$$I = -3 \frac{10}{5 + j10} = -2 \text{ A}$$

c) Find the total $i(t)$

$$\text{Total } i(t) = 0.707 \cos(10t - 45^\circ) - 2 \text{ A}$$

2. Find the phase equivalent current source of the circuit below (i.e. its source transform)



$$Z_L = j\omega L = j10$$

$$10 \angle 45^\circ \parallel (10 + j10) = \frac{10 \angle 45^\circ}{10 + j10} \parallel (10 + j10) = 0.707 \angle 0^\circ \parallel (10 + j10)$$