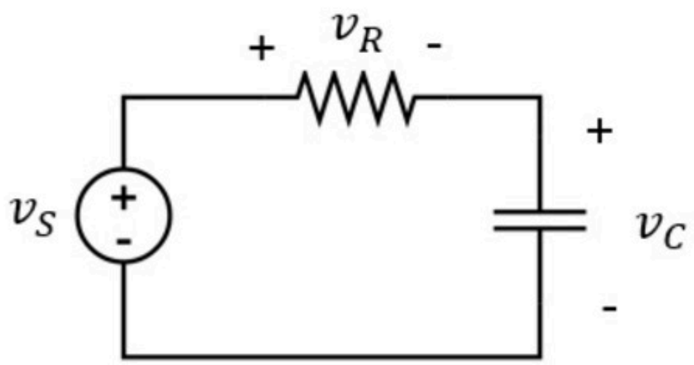
Phasors 004

Problem has been graded.

You are given $v_S = A_1 \cdot \sqrt{2} \cdot cos\,(100t + B_1)$

$v_C = A_2 \cdot cos\,(100t + B_2)$

Find $v_R = A_3 \cdot cos\,(100t + B_3)$ with $-180° \leq B_3 \leq 180°$



Solve without using a calculator.

Given Variables:

A1 : 4 V

B1 : 20 degrees

A2 : 4 V

B2 : -25 degrees

Calculate the following:

A3 (V) :

4 ✓

B3 (degrees) :

65 ✓

Hint: Convert to phasors. Multiply out the common exp(jB) factor.

You are given $v_S = A_1 \cdot \sqrt{2} \cdot \cos(100t + B_1)$

$v_C = A_2 \cdot \cos(100t + B_2)$

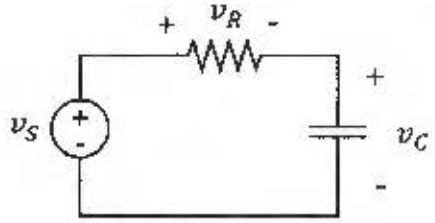
Find $v_R = A_3 \cdot \cos(100t + B_3)$ with $-180° \leq B_3 \leq 180°$

A1 : 2 V

B1 : 35 degrees

A2 : 2 V

B2 : -10 degrees



Solve without using a calculator.

$$V_S = 2\sqrt{2}\, e^{j35°} \qquad V_C = 2\, e^{-j10°}$$

KVL: $V_R = V_S - V_C = 2\sqrt{2}\, e^{j35°} - 2\, e^{-j10°}$

$$= 2\, e^{j35°}\left(\sqrt{2} - e^{-j45°}\right)$$

$$= 2\, e^{j35°}\left(\sqrt{2} - \left(\frac{\sqrt{2}}{2} - j\frac{\sqrt{2}}{2}\right)\right)$$

$$= 2\, e^{j35°}\left(\frac{\sqrt{2}}{2} + j\frac{\sqrt{2}}{2}\right)$$

$$= 2\, e^{j35°}\, e^{j45°}$$

$$= 2\, e^{j80°}$$

$$\Rightarrow v_R = 2\cos(100t + 80°)$$

$\boxed{A_3 = 2V}$ $\boxed{B_3 = 80°}$