

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

A1 : 2 V

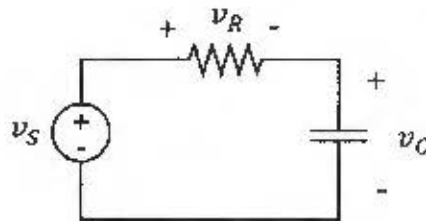
$$v_C = A_2 \cdot \cos(100t + B_2)$$

B1 : 35 degrees

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

A2 : 2 V

B2 : -10 degrees



Solve without using a calculator.

$$V_S = 2\sqrt{2} e^{j35^\circ}$$

$$V_C = 2 e^{-j10^\circ}$$

$$\begin{aligned} \text{KVL: } V_R &= V_S - V_C = 2\sqrt{2} e^{j35^\circ} - 2 e^{-j10^\circ} \\ &= 2 e^{j35^\circ} (\sqrt{2} - e^{-j45^\circ}) \\ &= 2 e^{j35^\circ} \left(\sqrt{2} - \left(\frac{\sqrt{2}}{2} - j \frac{\sqrt{2}}{2} \right) \right) \\ &= 2 e^{j35^\circ} \left(\frac{\sqrt{2}}{2} + j \frac{\sqrt{2}}{2} \right) \\ &= 2 e^{j35^\circ} e^{j45^\circ} \\ &= 2 e^{j80^\circ} \end{aligned}$$

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

$$A_3 = 2 \text{ V}$$

$$B_3 = 80^\circ$$