Activity 1

Measured resistance of 2.2kΩ resistor = 2.15kΩ

frequency = 5KHz $\quad \omega = 2\pi f = \frac{2\pi}{T} \Rightarrow T = 0.0002\,s$

peak to peak voltage = 3.3V

$V_{S,MAX}$ = 3.165V

$V_{S,MIN}$ = 78.21mV

$\Rightarrow V_{S,\text{peak to peak}}$ = 3.087V — not 3.3V as the source has internal resistance

$V_{C,MAX}$ = 2.887V

$V_{C,MIN}$ = 458mV

$\Rightarrow V_{C,\text{peak to peak}}$ = 2.429V

CH13 lagging CH1A by 20μs

	peak to peak (V)	Amplitude (V)	RMS (V)	measured ΔT (μs)	phase angle	phasor
V_S	3.087	1.5435	1.0914	—	0°	$1.54\angle 0°$
V_C	2.429	1.2145	0.8589	20	−36°	$1.21\angle -36°$
V_R	1.753	0.8765	0.6198	−30	54°	$0.88\angle 54°$

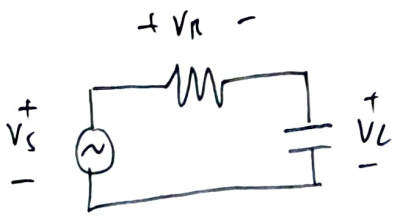
V_C lagging V_S by 20μs $\quad \Delta T = 20\mu s$

$\text{phase angle} = -\frac{20\mu s}{2\times10^{-4}\,s} \times 360° = -36°$

V_S lagging V_R by 30μs $\quad \Delta T = -30\mu s$

$\text{phase angle} = -\frac{-30\mu s}{2\times10^{-4}\,s} \times 360 = 54°$

11. KVL cannot be applied to RMS voltages



$V_S - V_C - V_R = 0$

$1.09 - 0.85 - 0.61 \approx -0.37 \neq 0$

violates KVL

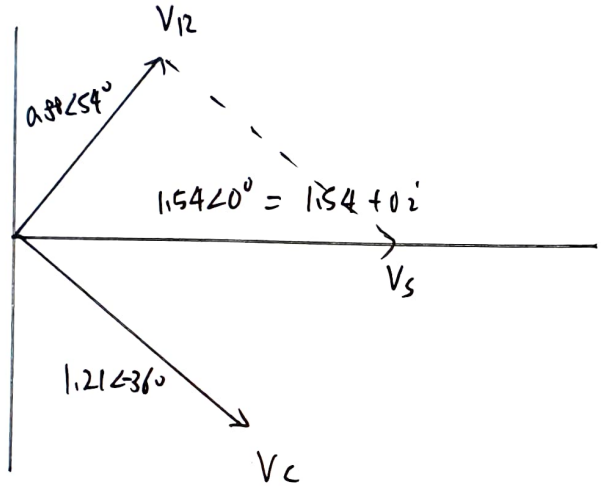
12. $V_S = 1.54 + 0i$

$V_C = 0.9789 - 0.7112i$

$V_R = 0.5172 + 0.7119i$

$V_C + V_R \approx 1.4961 \approx 1.54$

13.



Activity 2

1. Impedence of resistor $= R\angle 0°$

$$I_S = \frac{V_R}{R\angle 0°} = \frac{0.88\angle 54°}{2.15k\Omega} = 409\mu\angle 54°$$

2. $Z_C = \frac{-i}{\omega C}$ where $\omega = 2\pi f = 10 \times 10^4 \pi$

3. $$Z_C = \frac{V_C}{I_S} = \frac{1.21\angle -36°}{409\mu\angle 54°} = 2958\angle -90°$$

$$-2958i = \frac{-i}{\omega C}$$

$$C = \frac{1}{2958 \times 10 \times 10^4 \pi}$$

$$= 10.7nF$$