Generation and Characteristics

Please do the following exercises individually.

Instantaneous Value

You have a signal which is sinusoidal has a frequency of 10 Hz. A measurement shows that its voltage is 5 V and its current 2 A. The current lags the voltage by 30°. Please draw the first period of the signal and specify the instantaneous value after one second.

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Parameters

Frequency:	f = 10 Hz	→	ω = 62.83 rad/s
Volrage:	V_{rms} = 5 V	→	V_{peak} = 7.07 V
Current:	I_{rms} = 2 A	→	I_{peak} = 2.83 A
Phase Shift:	φ = 30°, lagging	→	φ = -0.5236 rad

Formulars

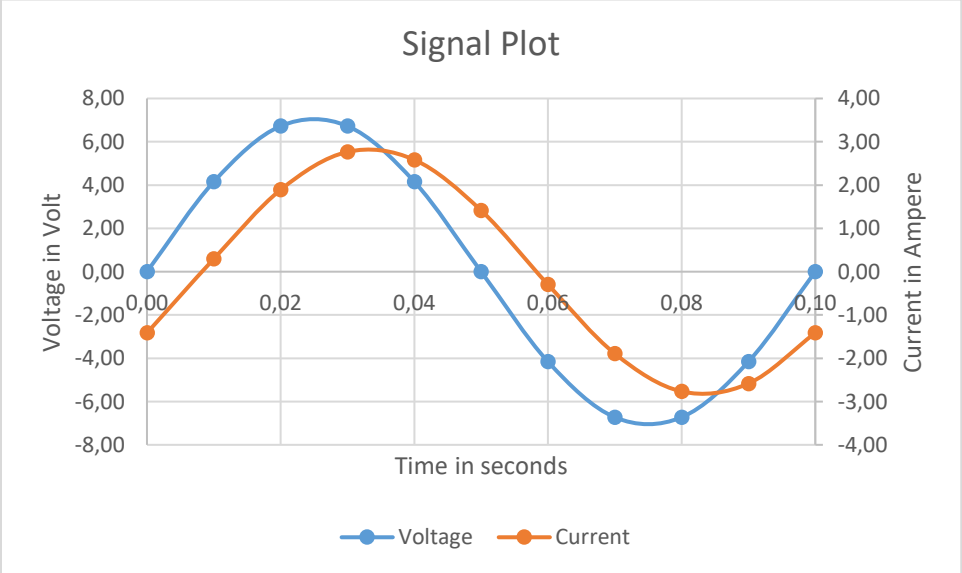
$v(t) = V_{peak} \cdot \sin(\omega t)$

$i(t) = I_{peak} \cdot \sin(\omega t + \varphi)$

Table of Values

t	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
v(t)	0.00	4.16	6.72	6.72	4.16	0.00	-4.16	-6.72	-6.72	-4.16	0.00
i(t)	-1.41	0.30	1.89	2.77	2.58	1.41	-0.30	-1.89	-2.77	-2.58	-1.41

Diagram



Instantaneous values

The frequency of the signal is 10 Hz. It repeats every tenth of a second. Therefore the instantaneous values after one second are the same as at the beginning.

v(1) = 0.00 V
i(1) = -1.41 A