Ohm's Law and Power Wheel

- $I = \sqrt{\dfrac{P}{R}}$
- $I = \dfrac{P}{V}$
- $I = \dfrac{V}{R}$
- **Amps** — I
- $V = \sqrt{P \times R}$
- $V = \dfrac{P}{I}$
- $V = I \times R$
- **Volts** — V
- $P = V \times I$
- $P = I^2 \times R$
- $P = \dfrac{V^2}{R}$
- **Power** — P
- $R = \dfrac{V}{I}$
- $R = \dfrac{V^2}{P}$
- $R = \dfrac{P}{I^2}$
- **Ohms(Ω)** — R

Conversions for Sinusoids

$A \sin(\omega t + \phi)$	$A \cos(\omega t + \phi - 90°)$
$-A \sin(\omega t + \phi)$	$A \sin(\omega t + \phi + 180°)$ Or $A \sin(\omega t + \phi - 180°)$
$-A \cos(\omega t + \phi)$	$A \cos(\omega t + \phi + 180°)$ Or $A \cos(\omega t + \phi - 180°)$
$A \sin(\omega t + \phi)$	$A \sin(\omega t + \phi - 360°)$ Or $A \sin(\omega t + \phi + 360°)$
$A \cos(\omega t + \phi)$	$A \cos(\omega t + \phi - 360°)$ Or $A \cos(\omega t + \phi + 360°)$

$i(t) = -8\sin(10t + 70°)$

$i(t) = 8\sin(10t + 70° + 180°)$

$i(t) = 8\cos(10t + 70° + 180° - 90°)$

Sinusoid-Phasor Transformations

Time Domain	Phasor Domain
$V_m \cos(\omega t + \phi)$	$V_m \angle \phi$
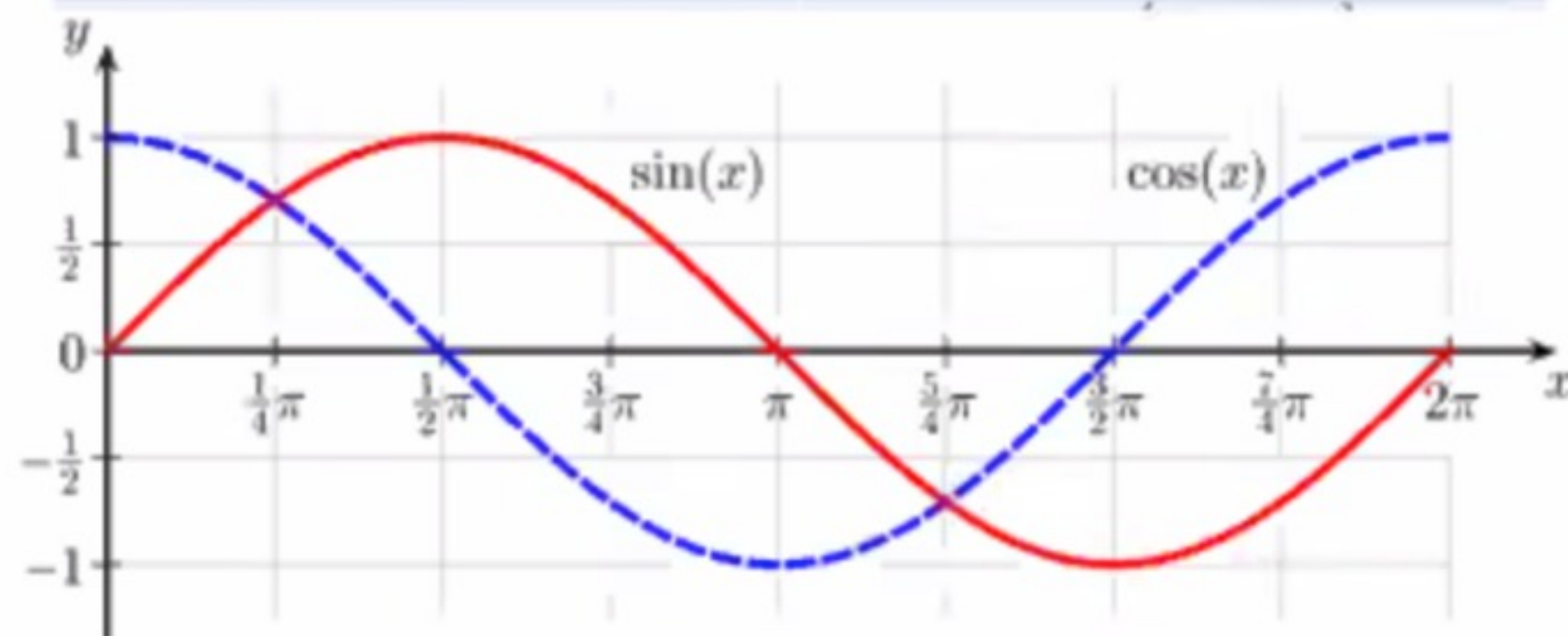
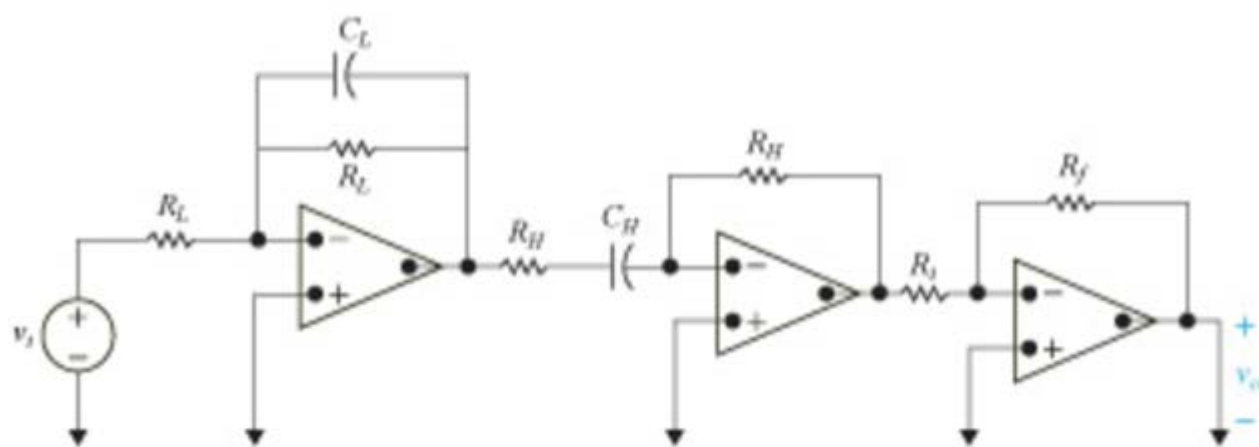# Ideal Op Amp Features
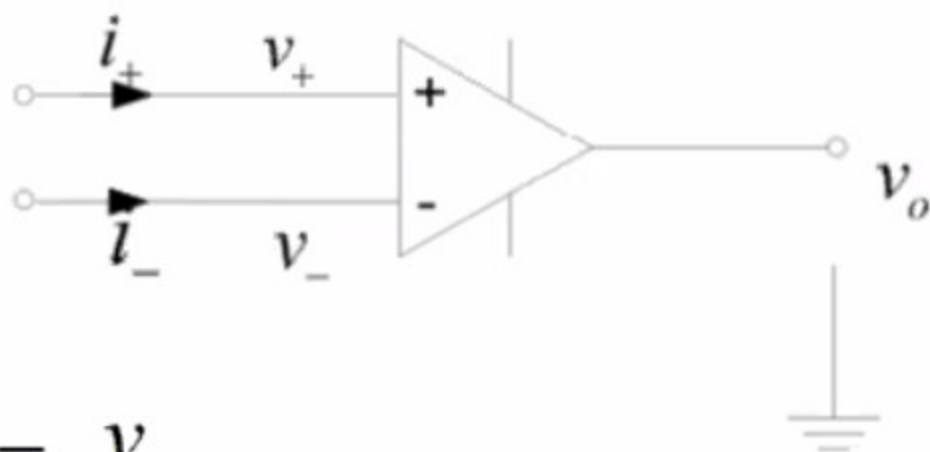
1) $$v_+ = v_-$$

2) $$i_+ = i_- = 0$$

The figures show a cascaded op amp bandpass filter and bandreject filter.

Bandpass filter:

Bandreject filter:

Low-pass

High-pass

Band-pass

Band-stop