IS1211/IS2111

Computer Networks

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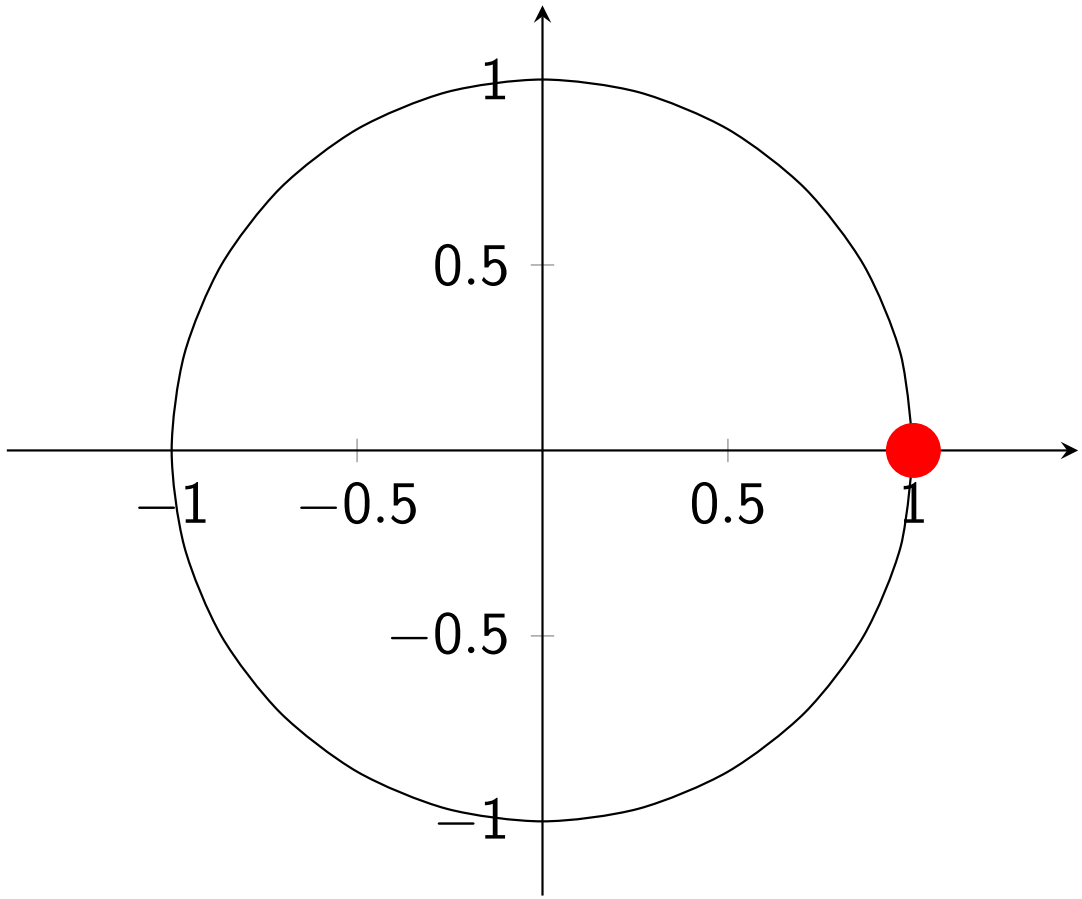
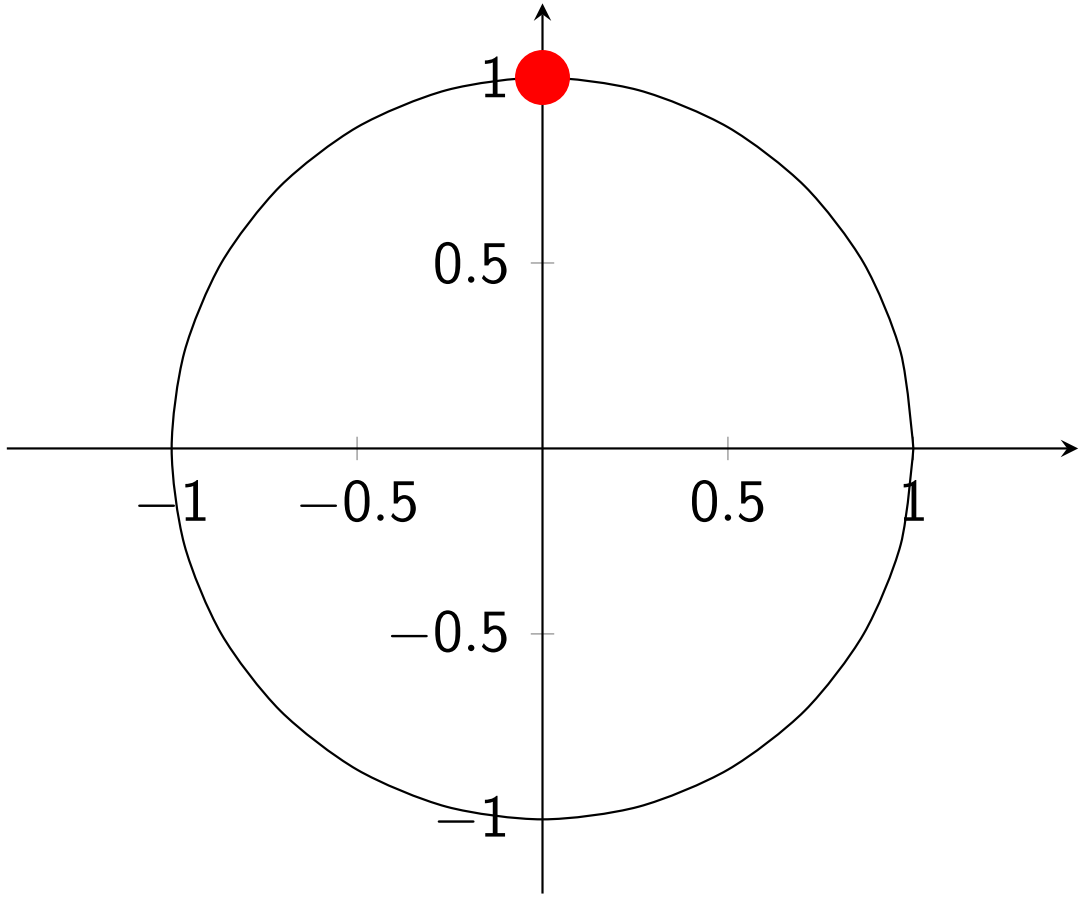
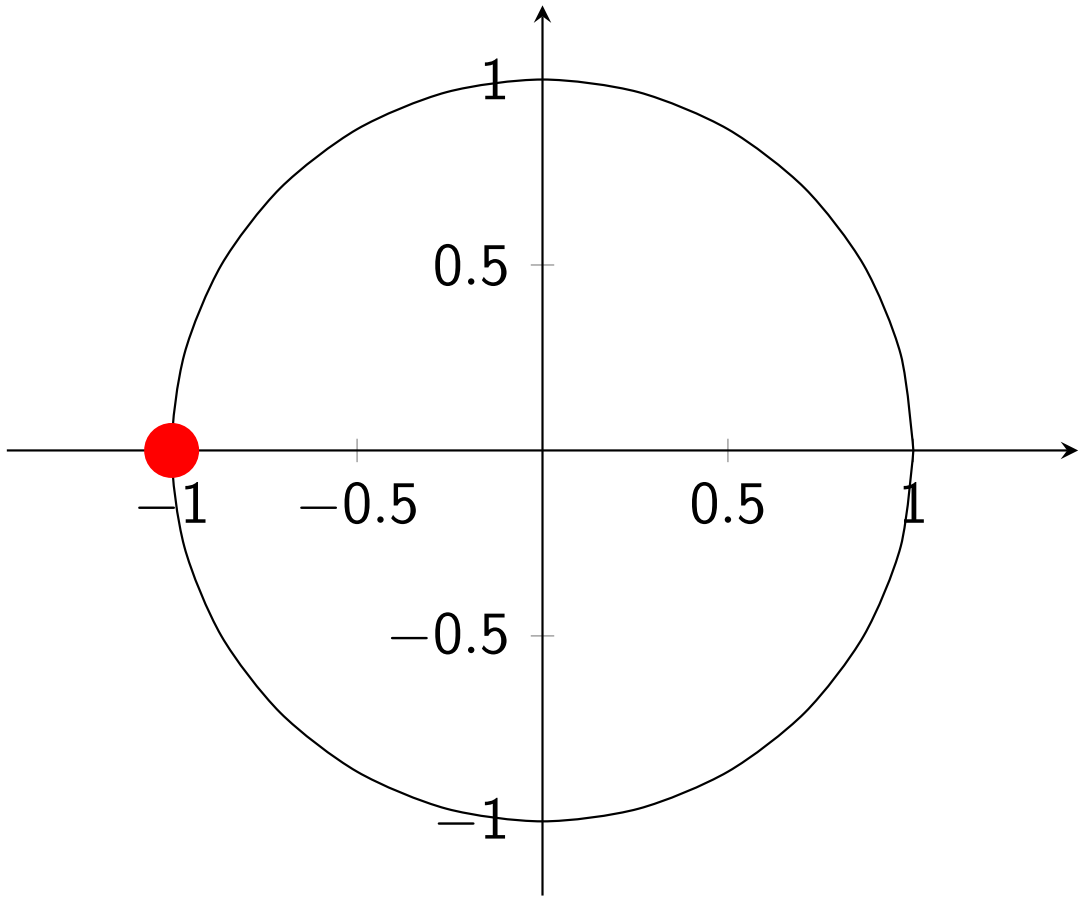
Walking Along a Circle - At $t = 0$



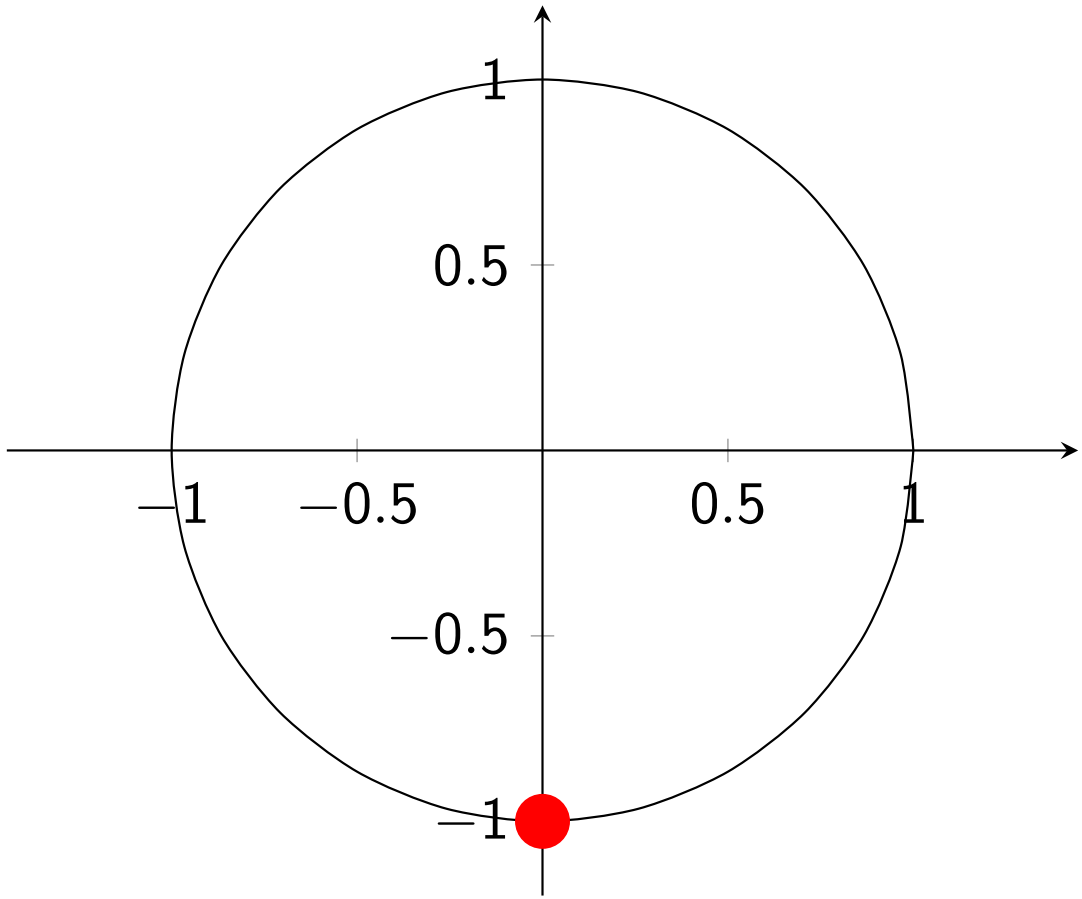
Walking Along a Circle - At $t = 0.25$



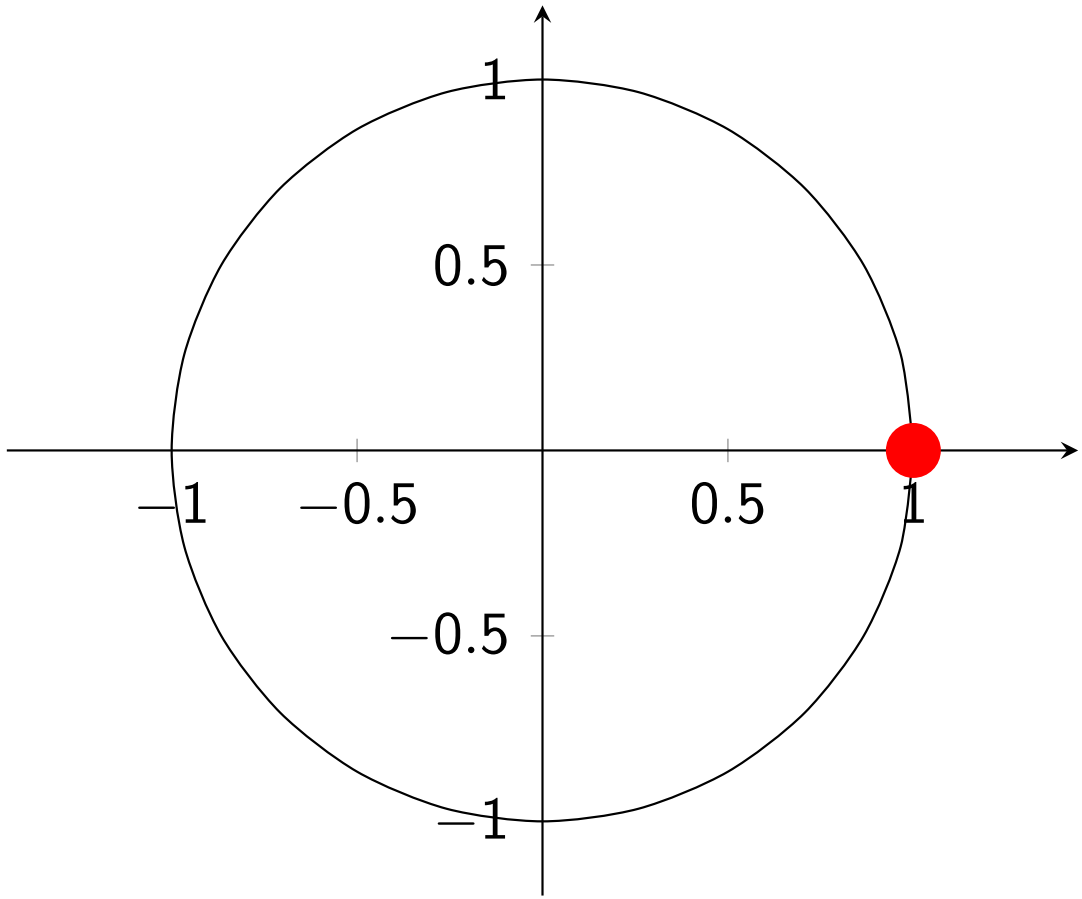
Walking Along a Circle - At $t = 0.5$



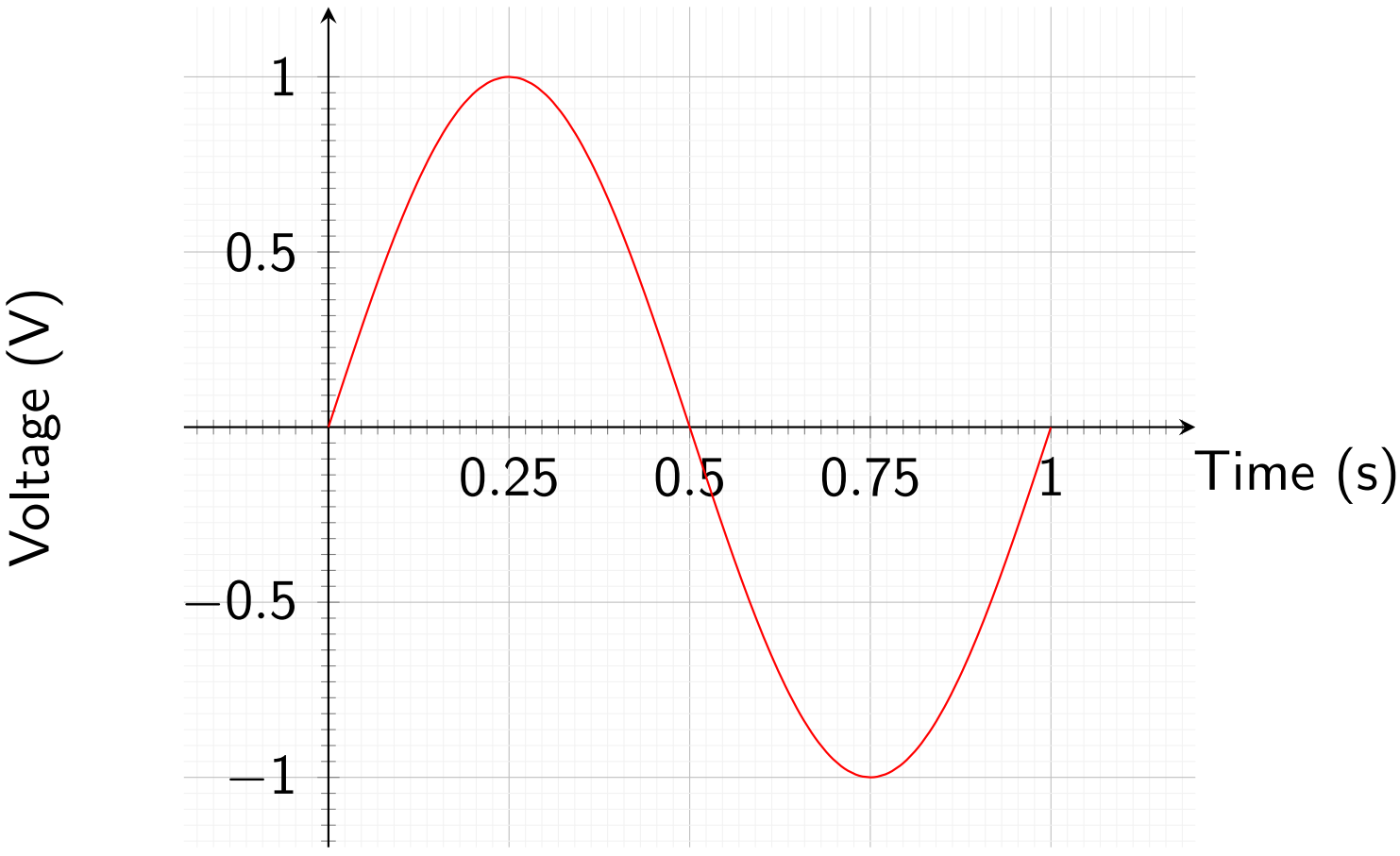
Walking Along a Circle - At $t = 0.75$



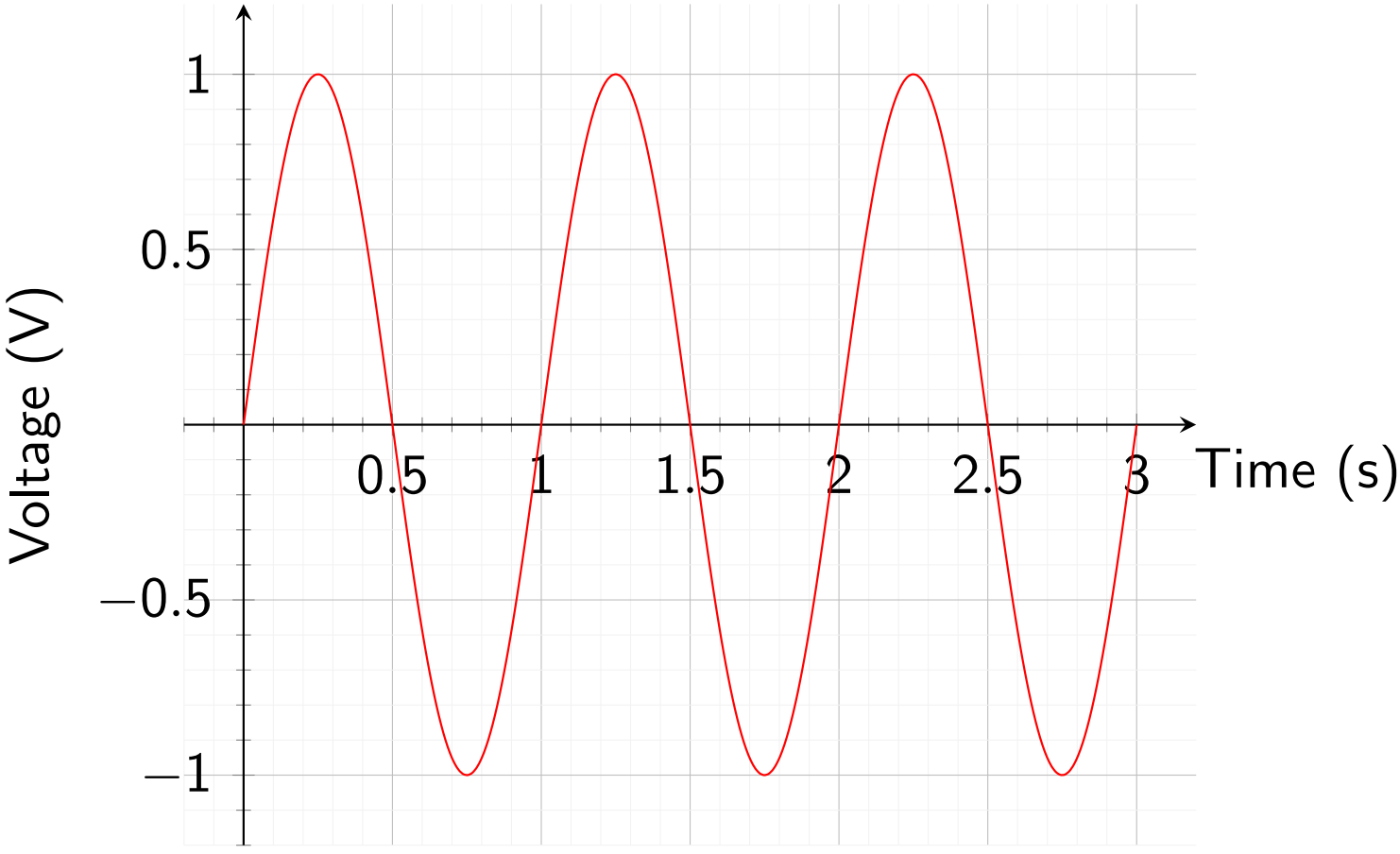
Walking Along a Circle - At $t = 1$



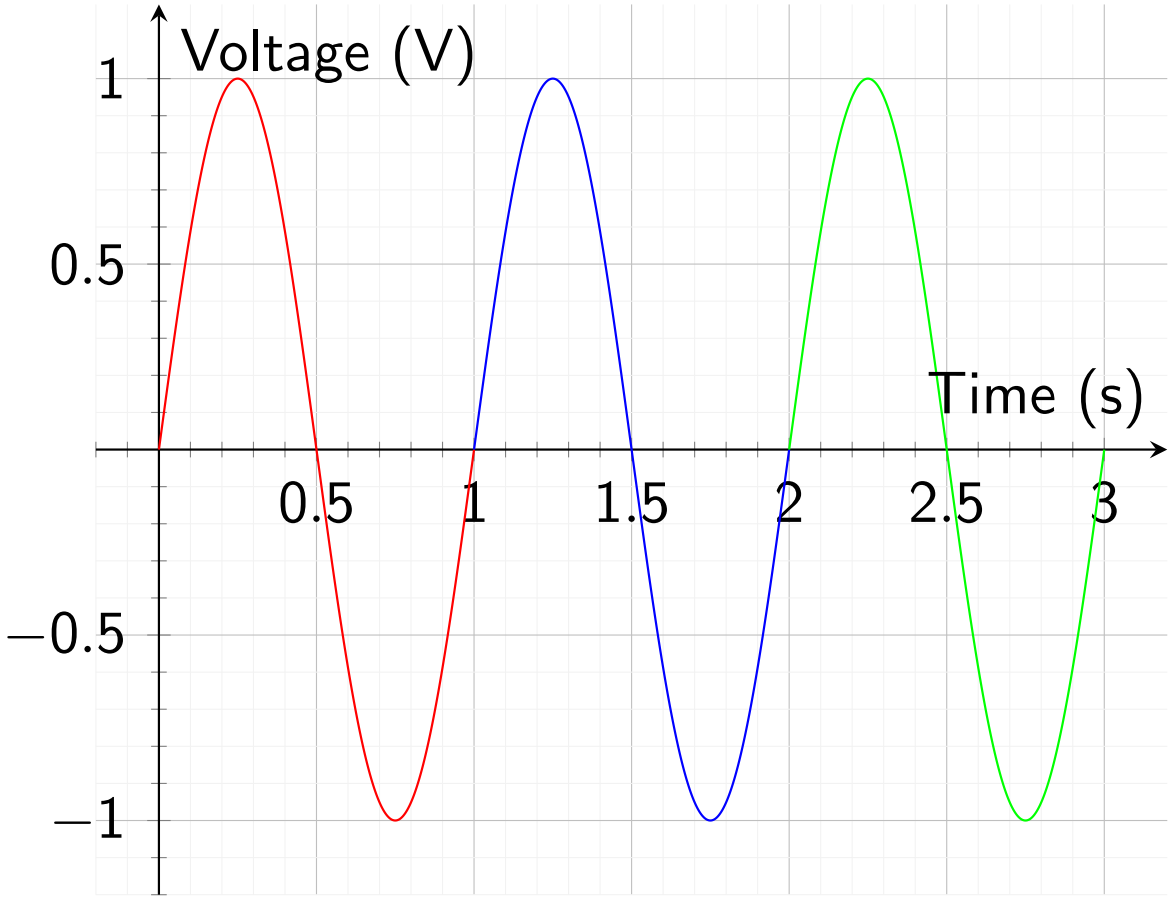
Sine Wave - One Cycle



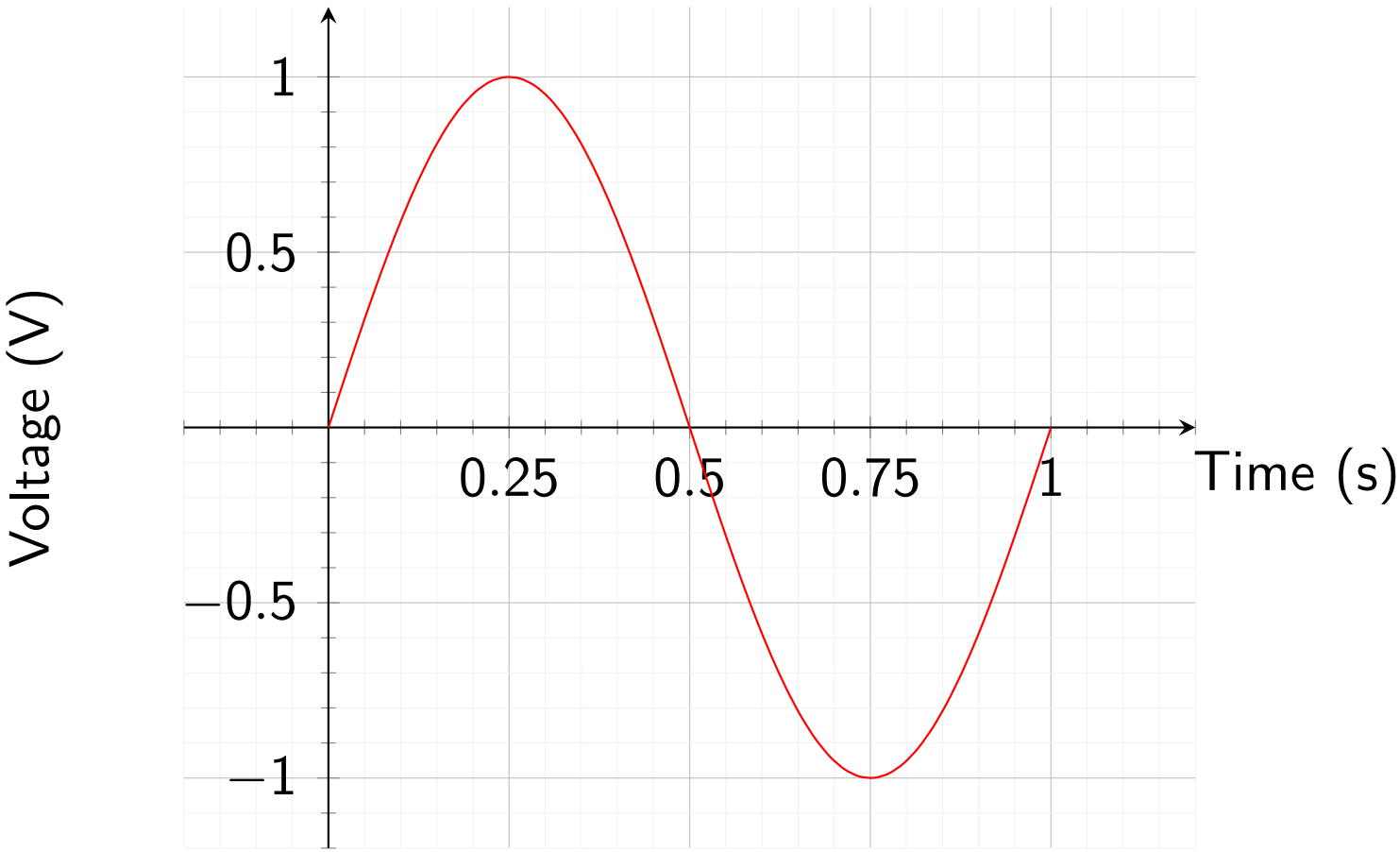
Sine Wave (sinusoid)



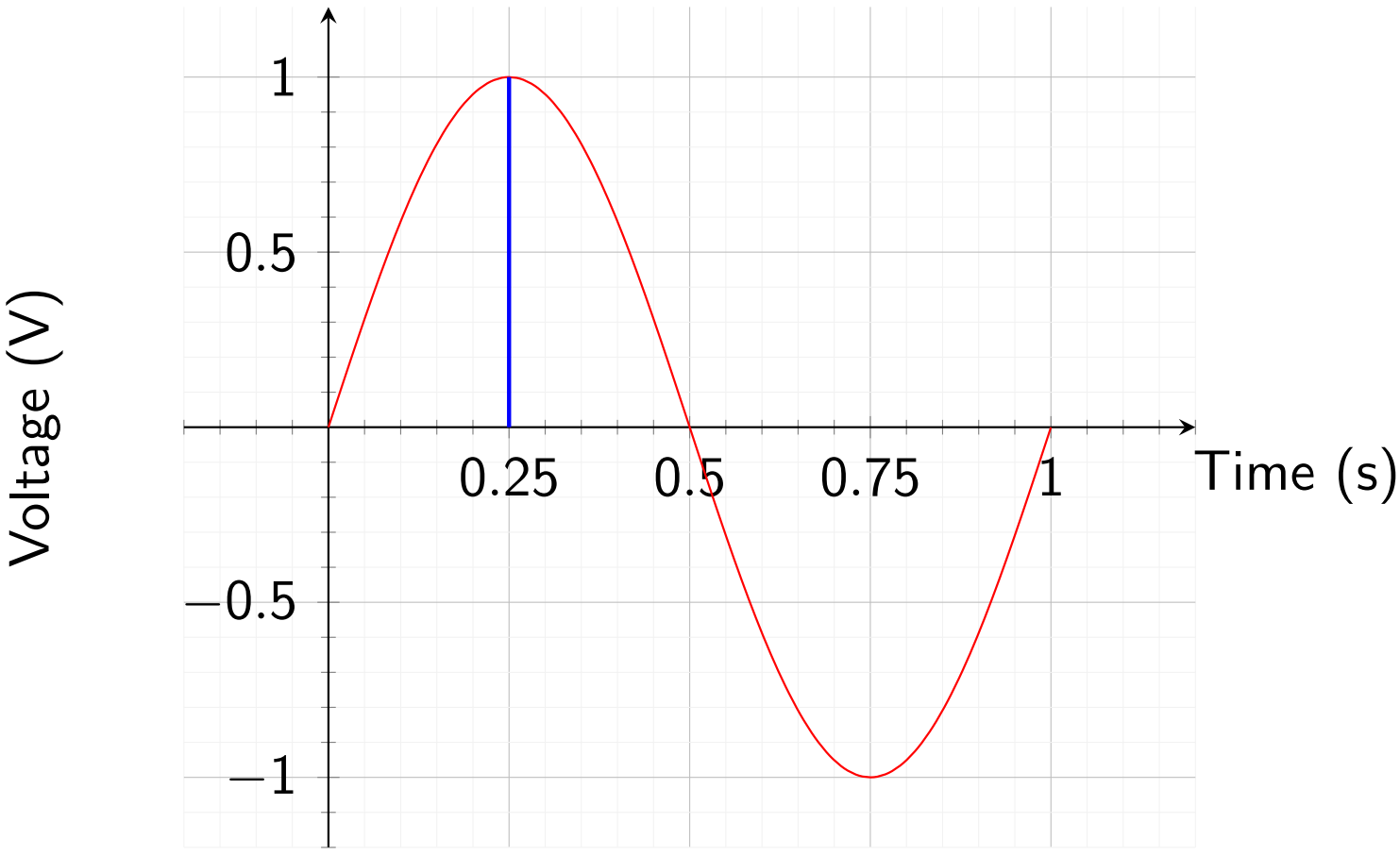
Sine Wave - Three Cycles



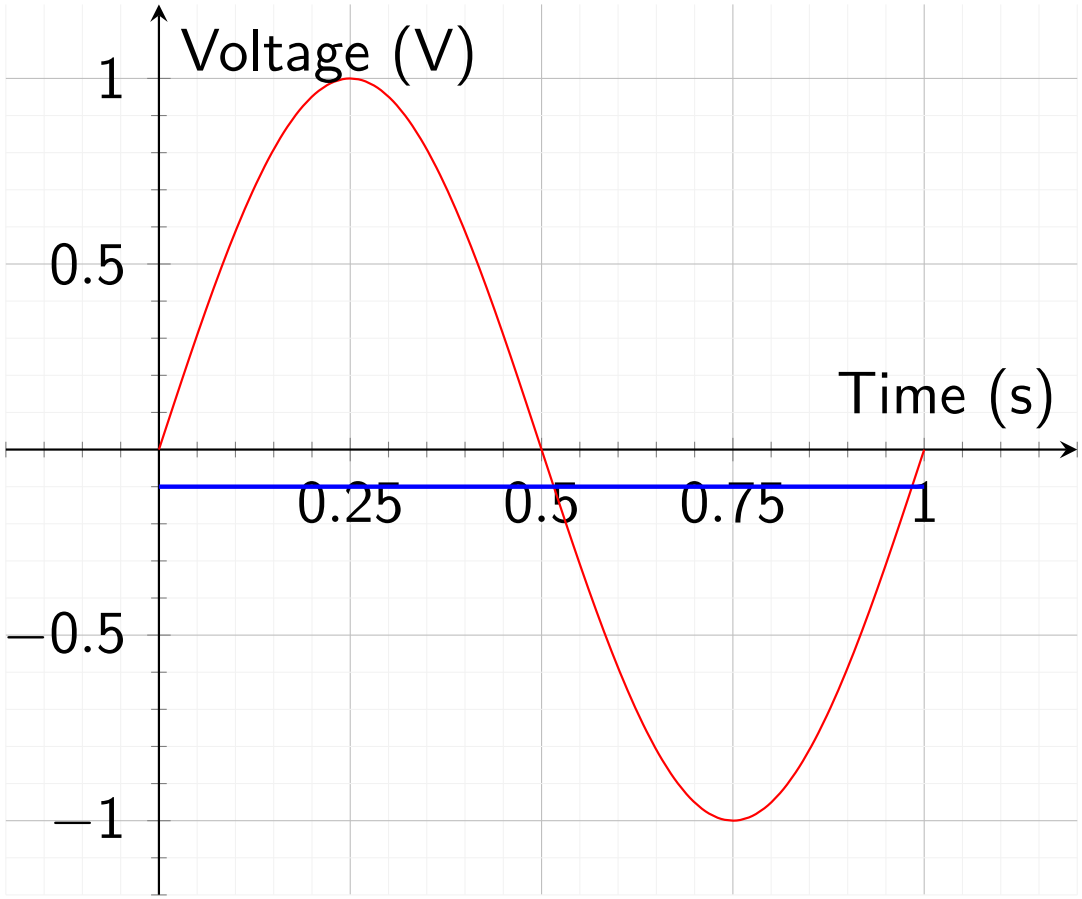
Sine Wave - One Cycle



Amplitude



Periodic Signal - Period



Frequency

Number of cycles per second.

$$Period = 1s$$

$$Frequency = 1Hz$$

Frequency

Number of cycles per second.

$$Period = 1ms$$

$$Frequency = 1000Hz = 1KHz$$

Frequency

Number of cycles per second.

$$Frequency = \frac{1}{Period}$$

$$f = \frac{1}{T}$$

Frequency $= f$
Period$= T$

Speed of Light

$$300,000 Kms^{-1}$$

Wave Length - Frequency $1Hz$

$$300,000Km$$

Wave Length - Frequency $1000Hz$

$$\frac{300,000Km}{1000} = 300Km$$

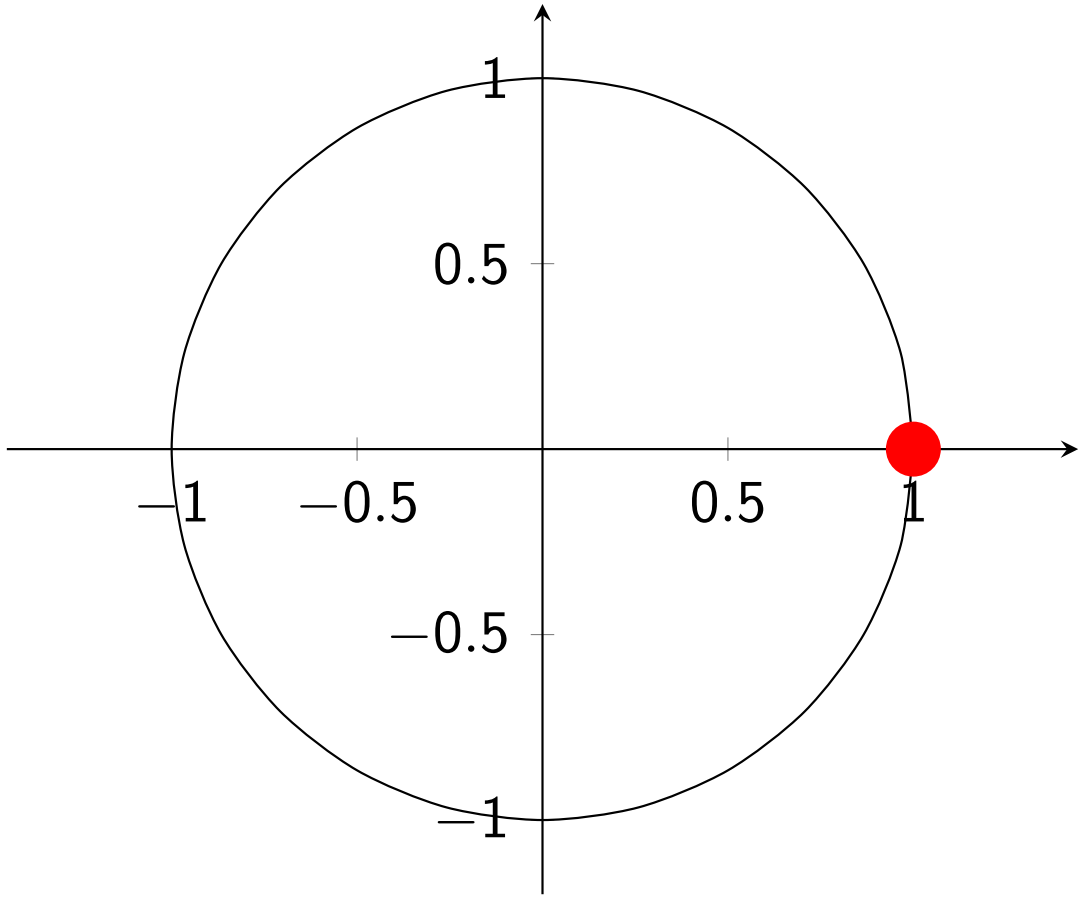
Wave Length - Frequency $1MHz$

$$\frac{300,000Km}{1000000} = 0.3Km = 300m$$

Wave Length (λ), Frequency (f), and Propagation Speed of the Signal (c)

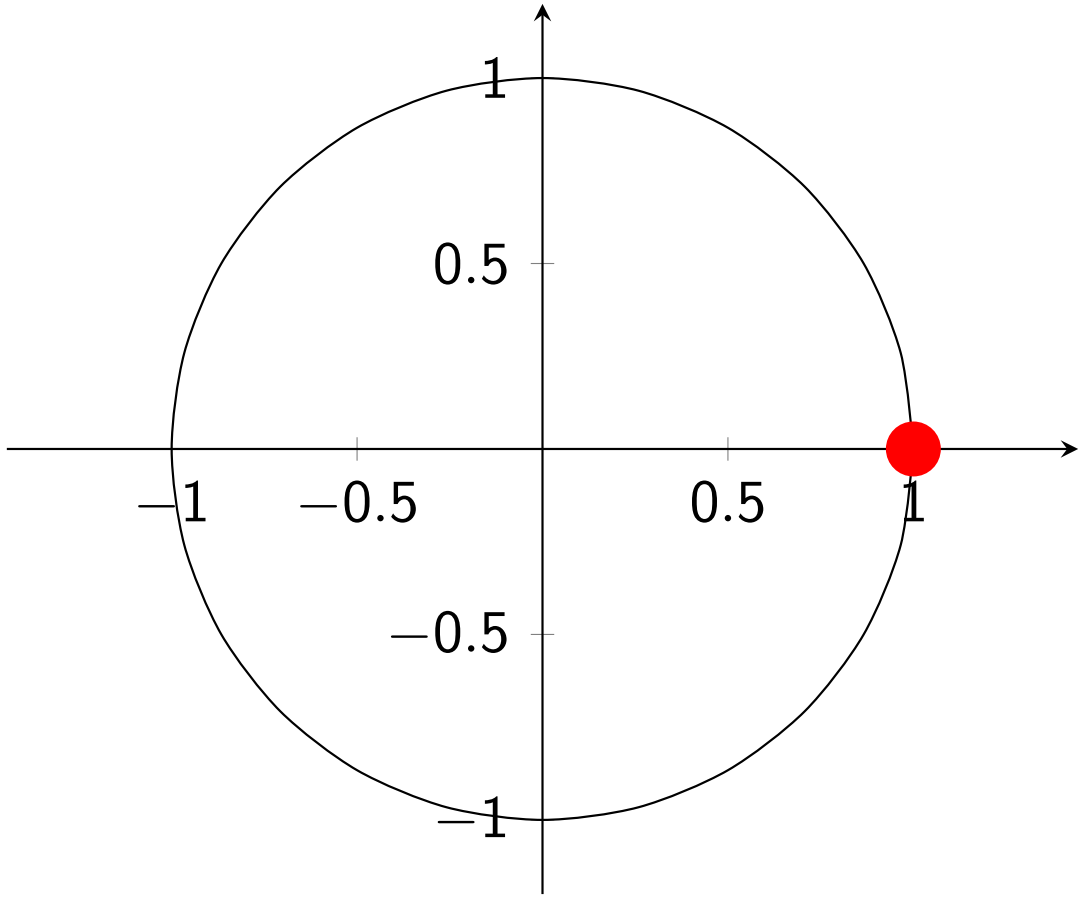
$$\lambda = \frac{c}{f}$$

Walking Along a Circle



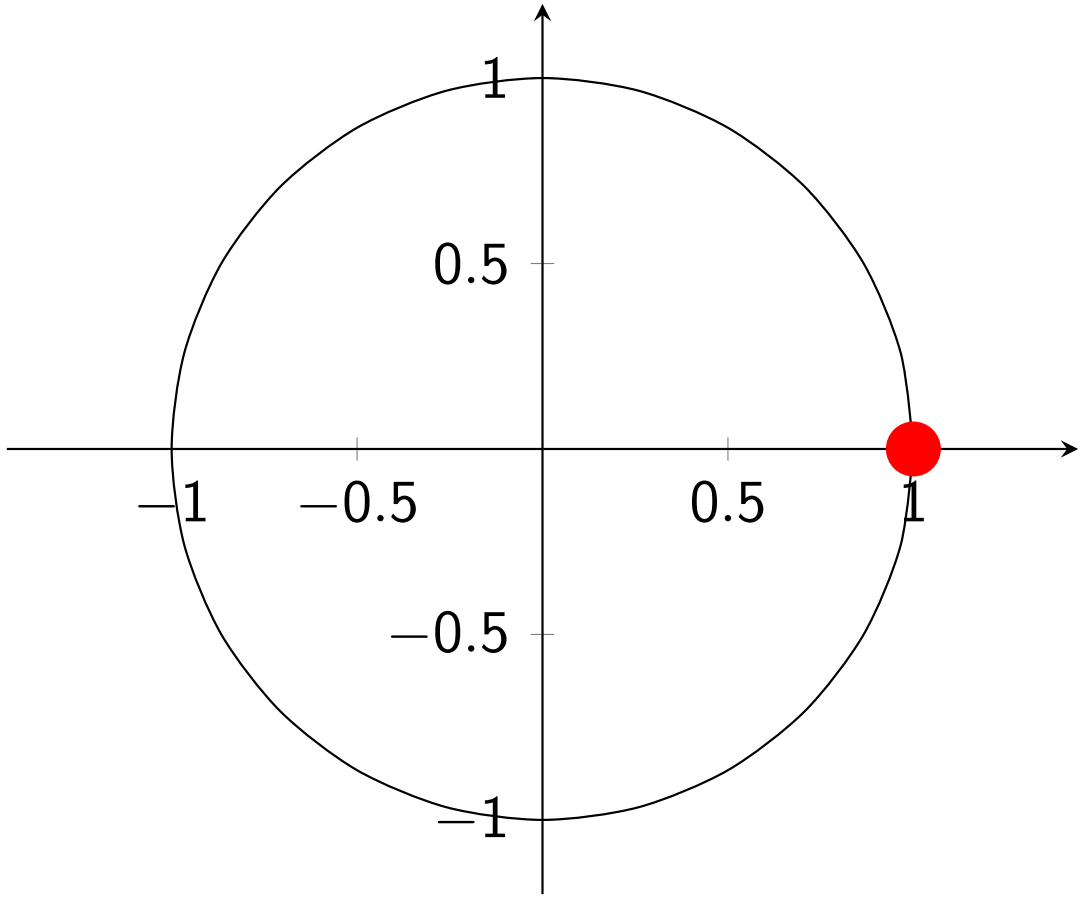
$$Angular\ Speed = \frac{360^\circ}{T}$$

Walking Along a Circle



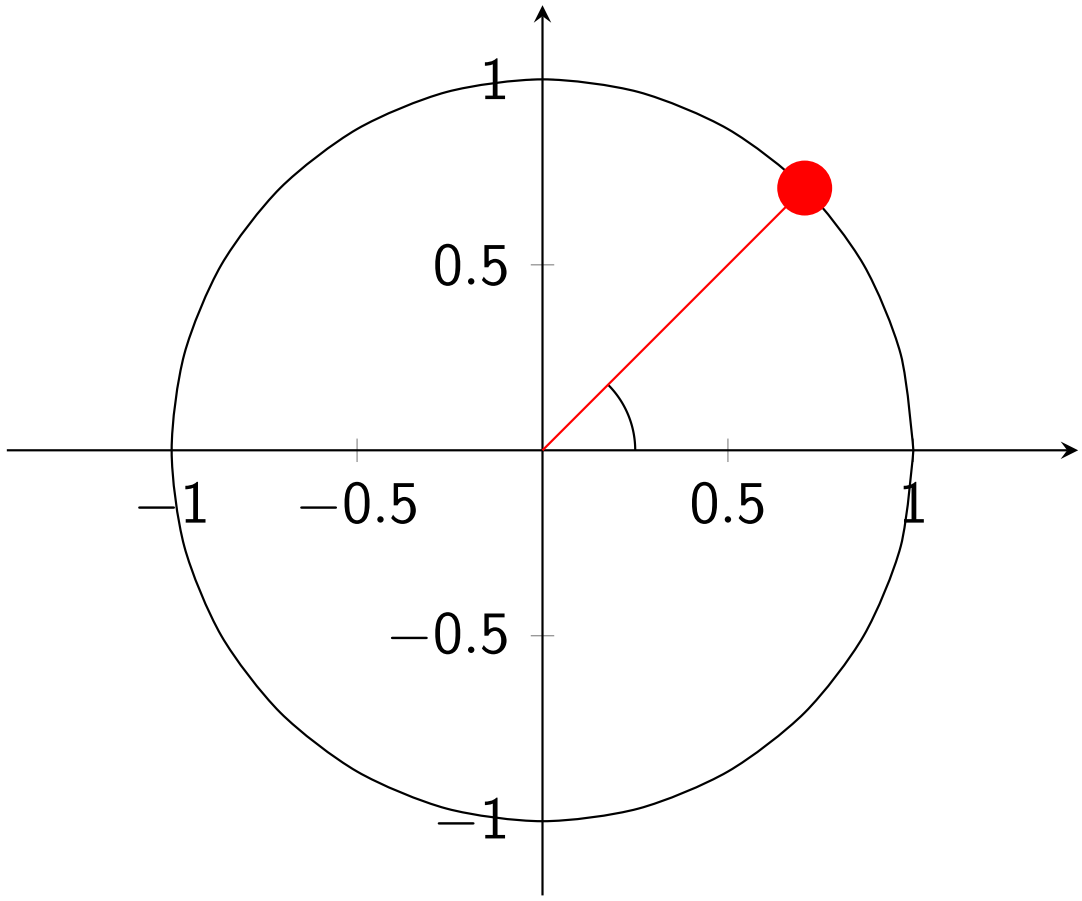
$$\omega = 360^\circ f$$

Walking Along a Circle



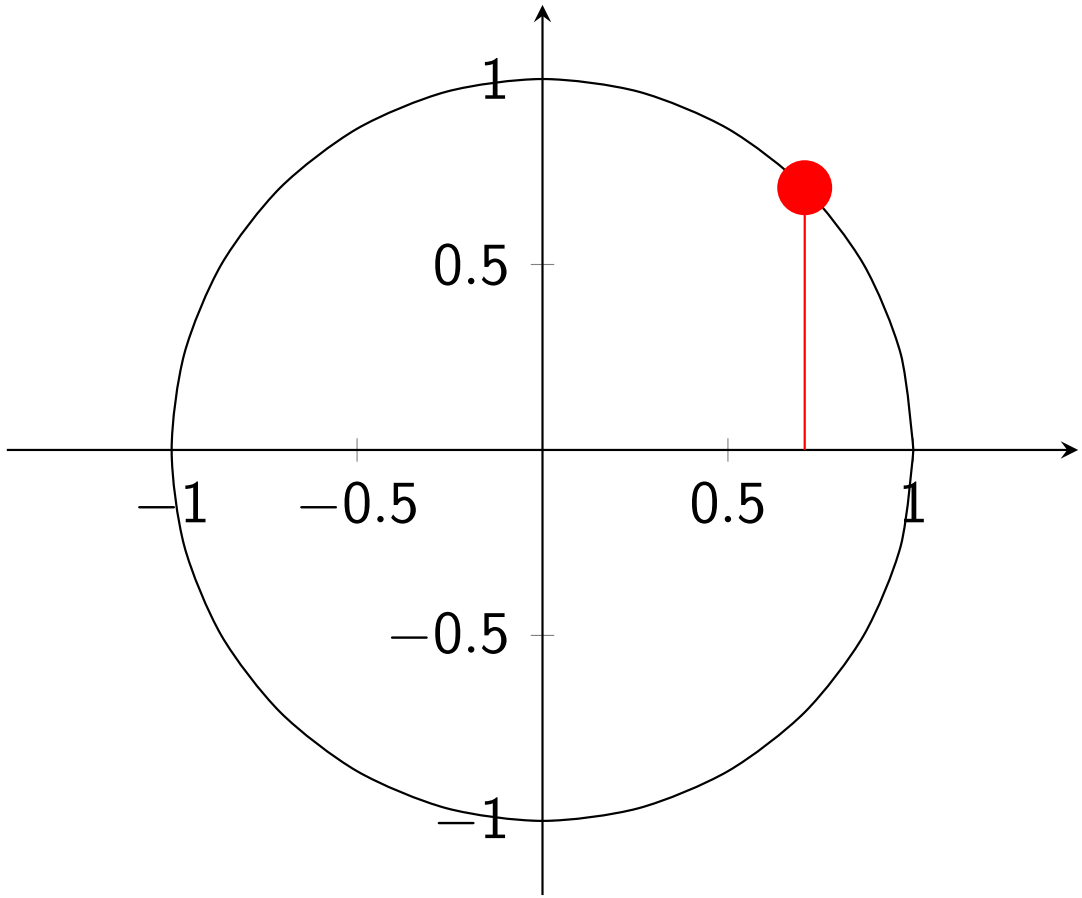
$$\omega = 2\pi f$$

Walking Along a Circle - Angle at time t



$$Angle = \omega t$$

Walking Along a Circle - Height time t

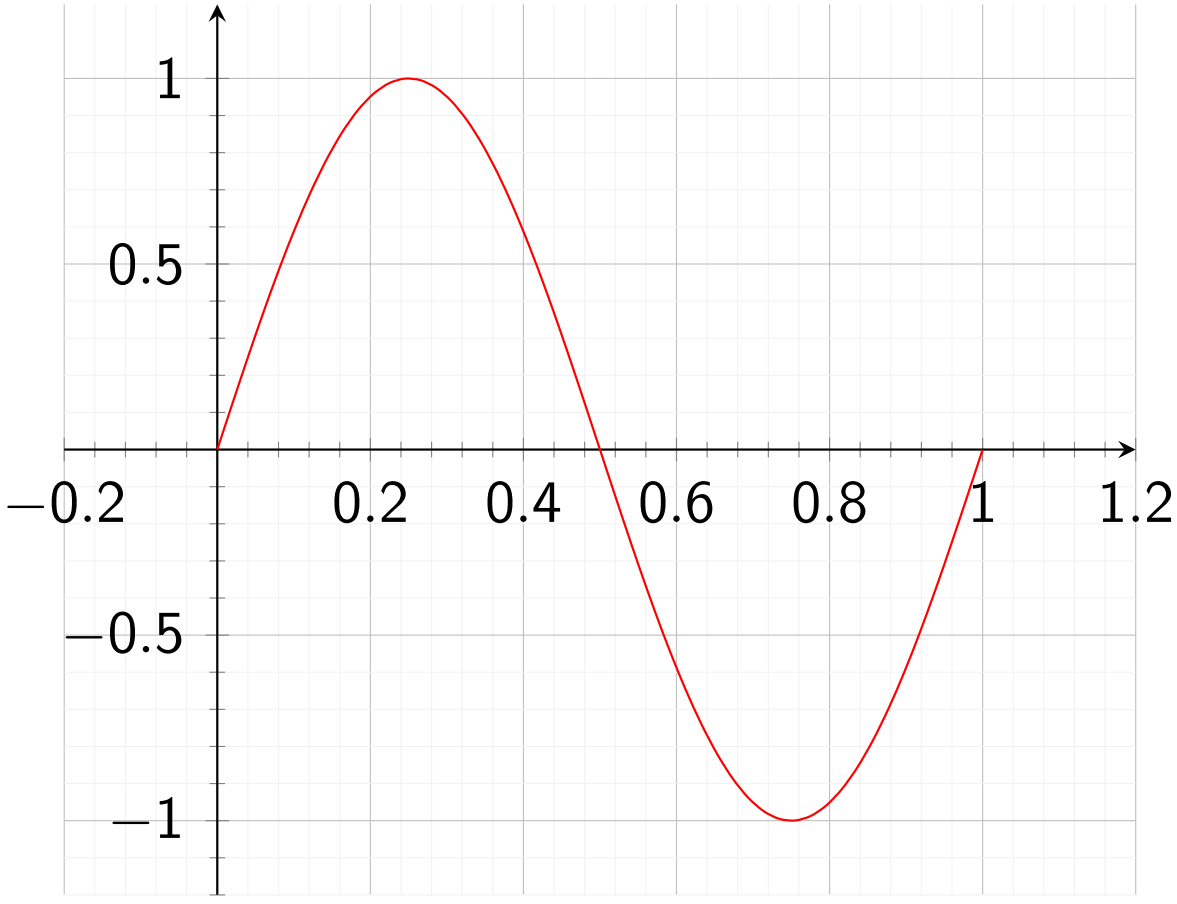


$$Height \;=\; Amplitude \;= sin(\omega t)$$

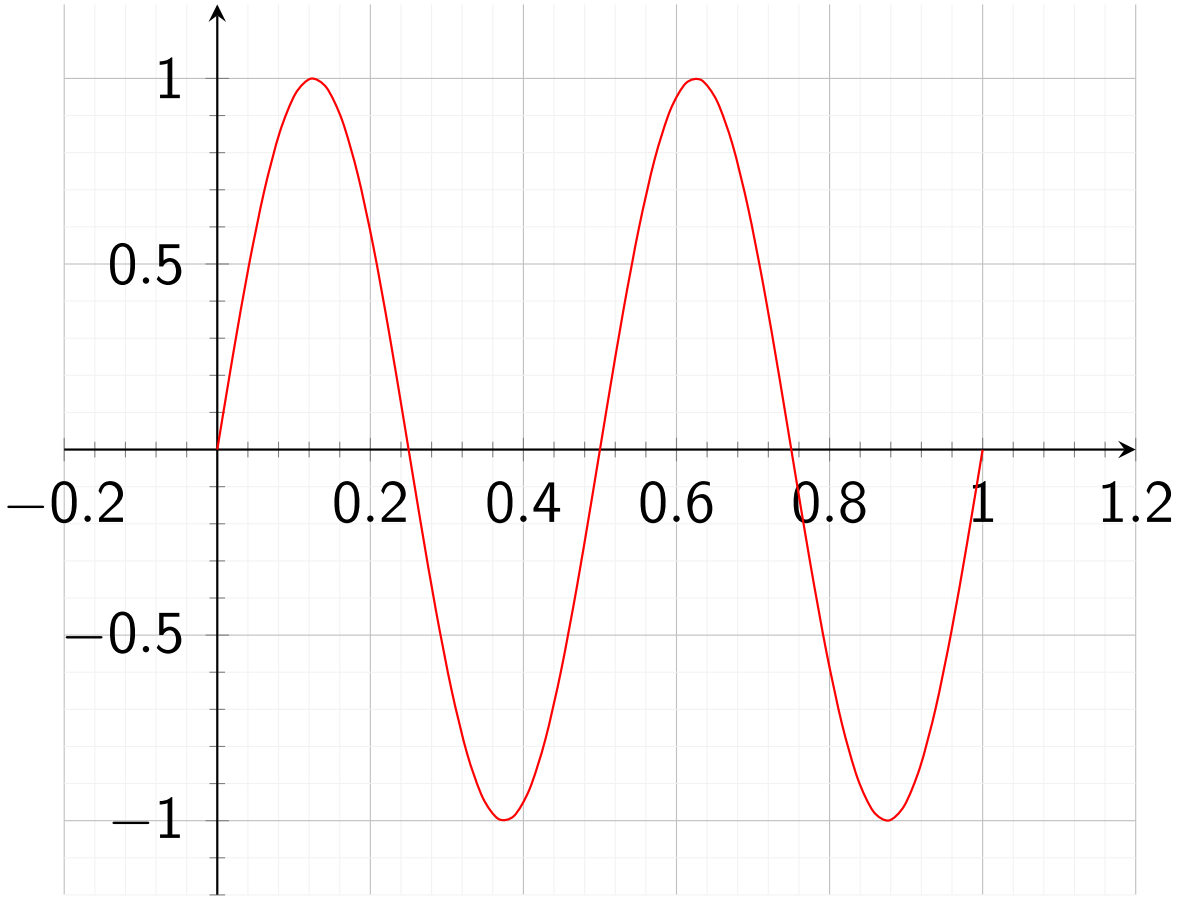
$$y = A\ sin(\omega t)$$

$$y = A\ sin(x)$$

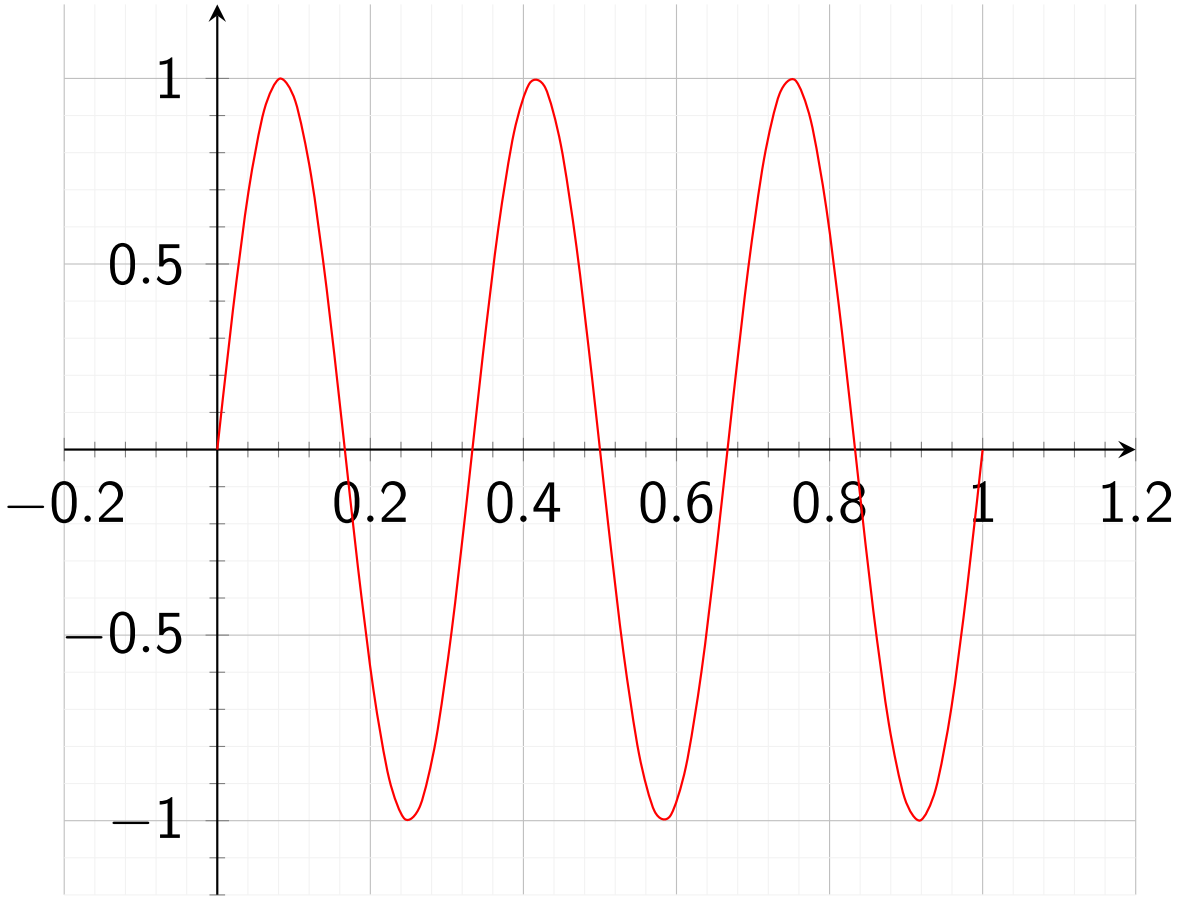
$y = sin(\omega t)$



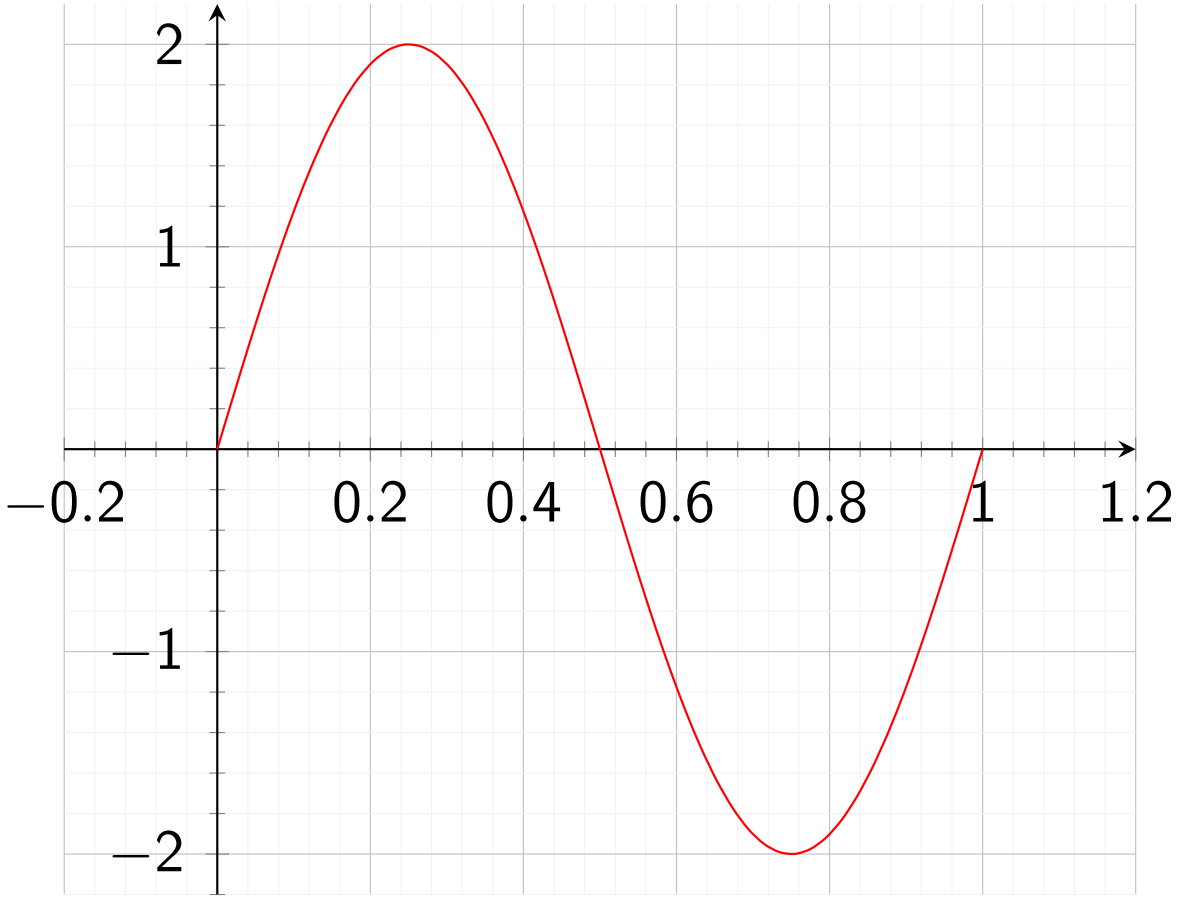
$y = sin(2\omega t)$



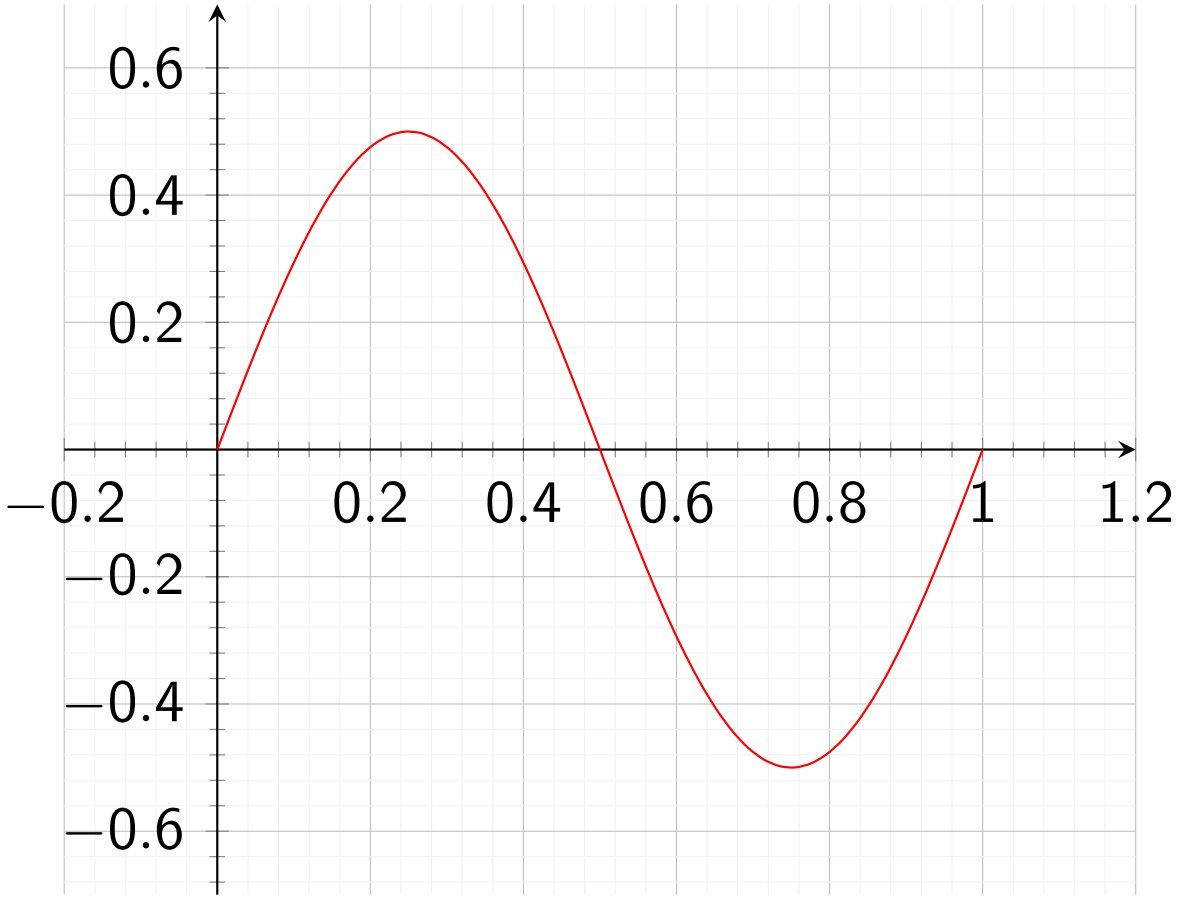
$y = sin(3\omega t)$



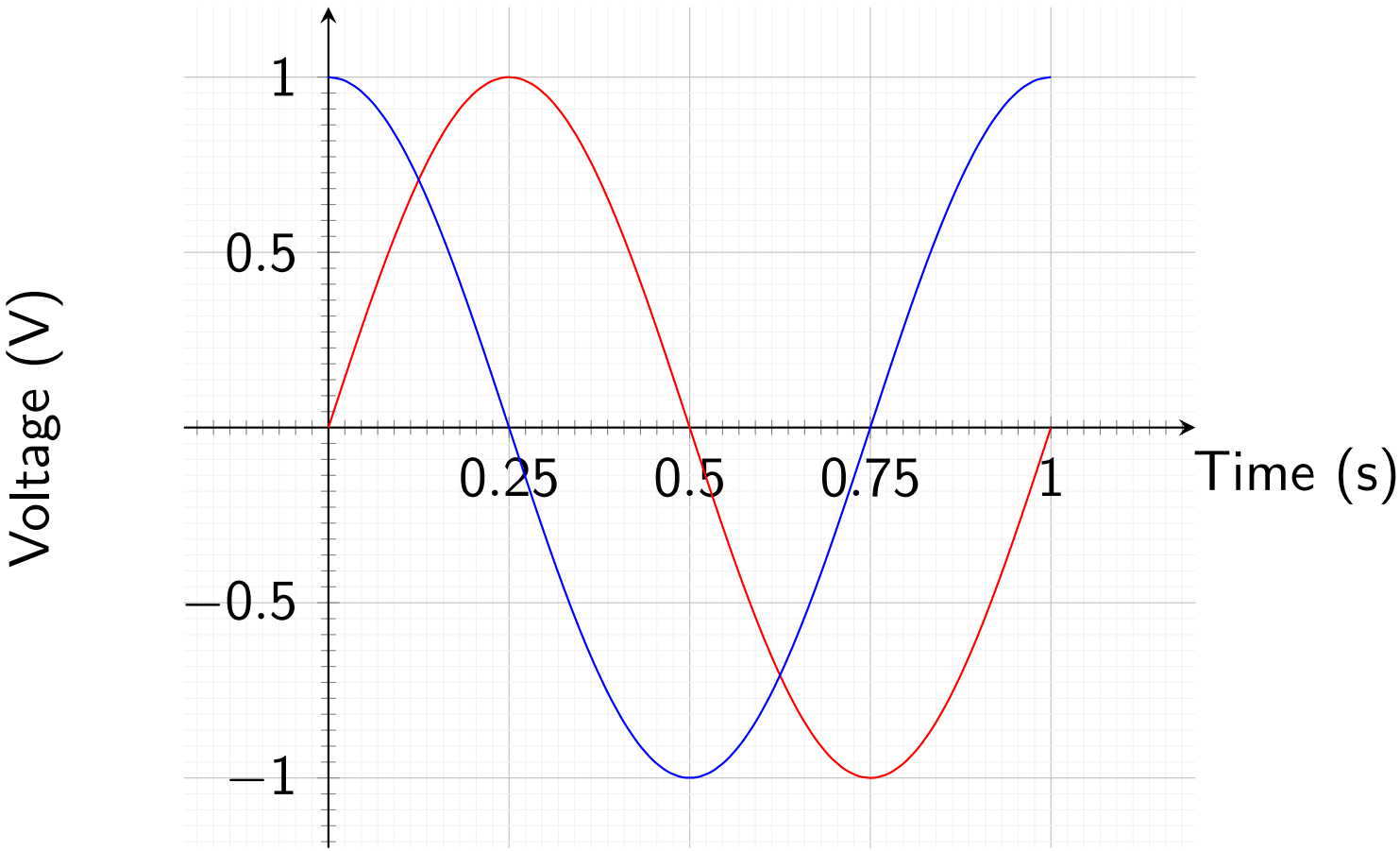
$y = 2sin(\omega t)$



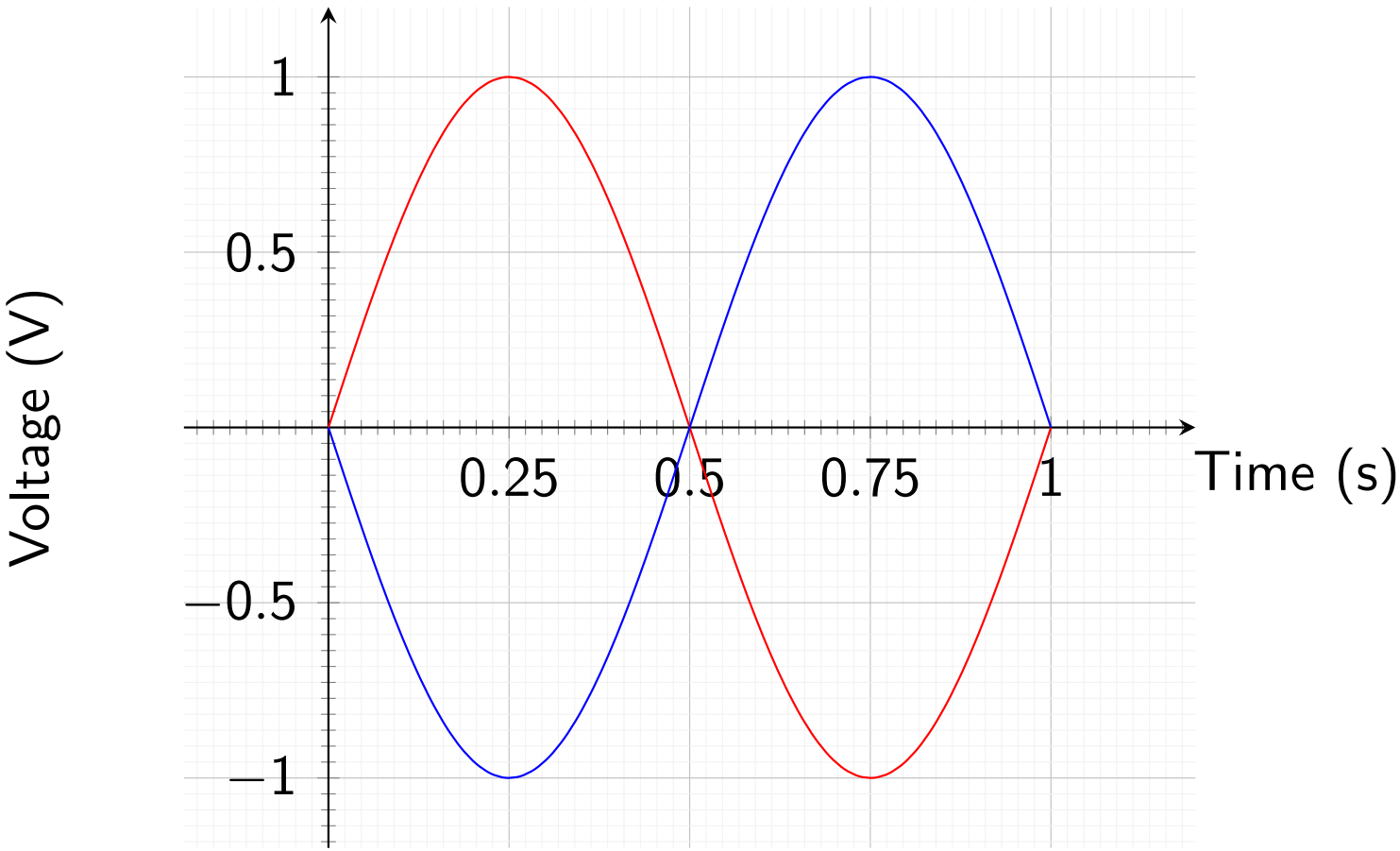
$y = 0.5sin(\omega t)$



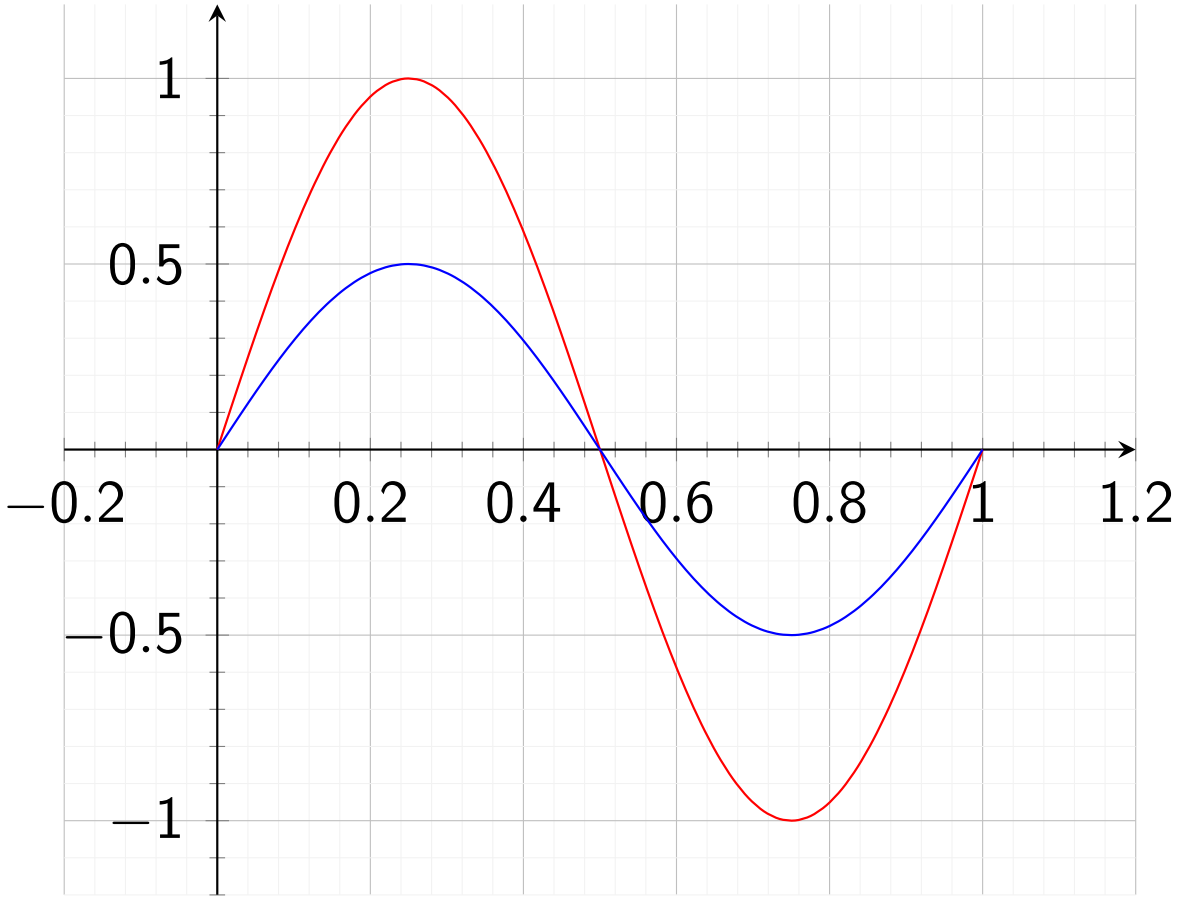
Phase



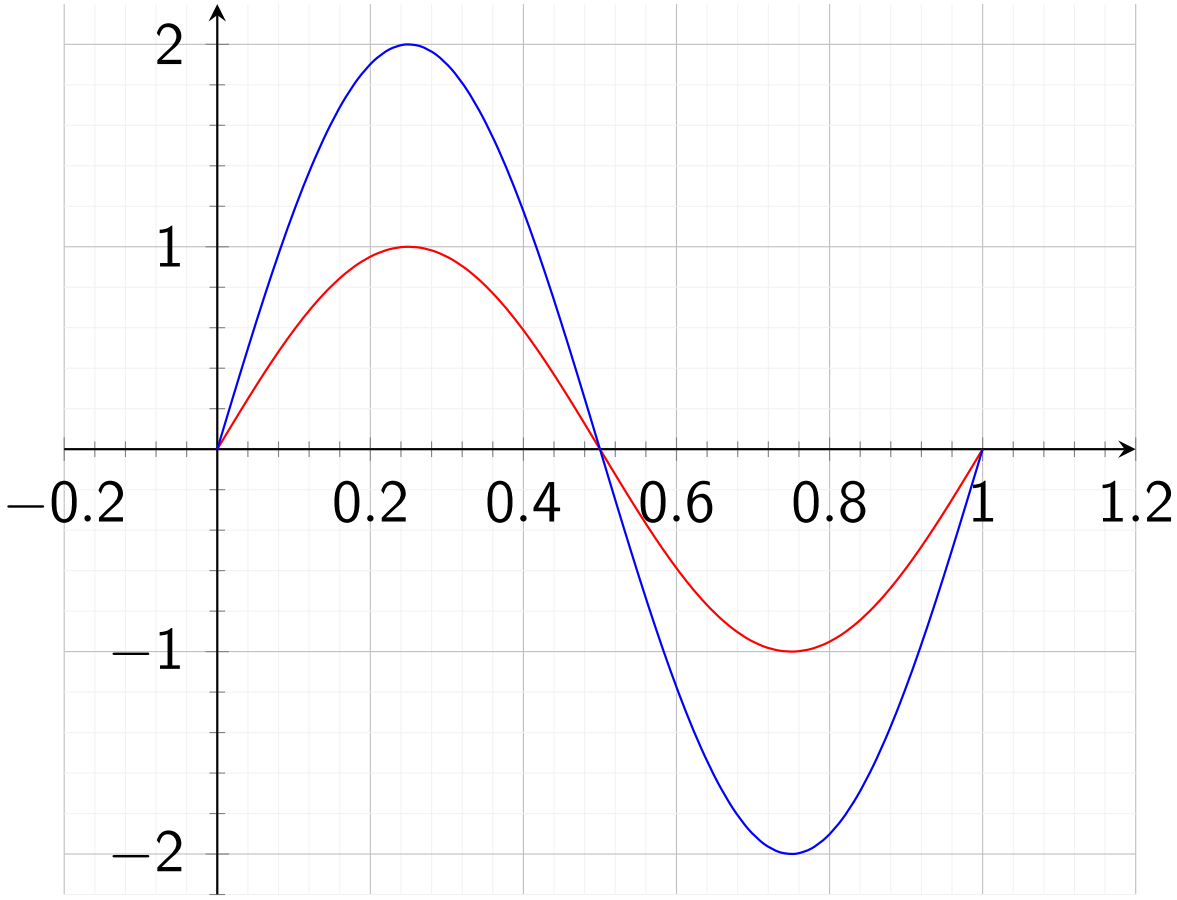
Phase



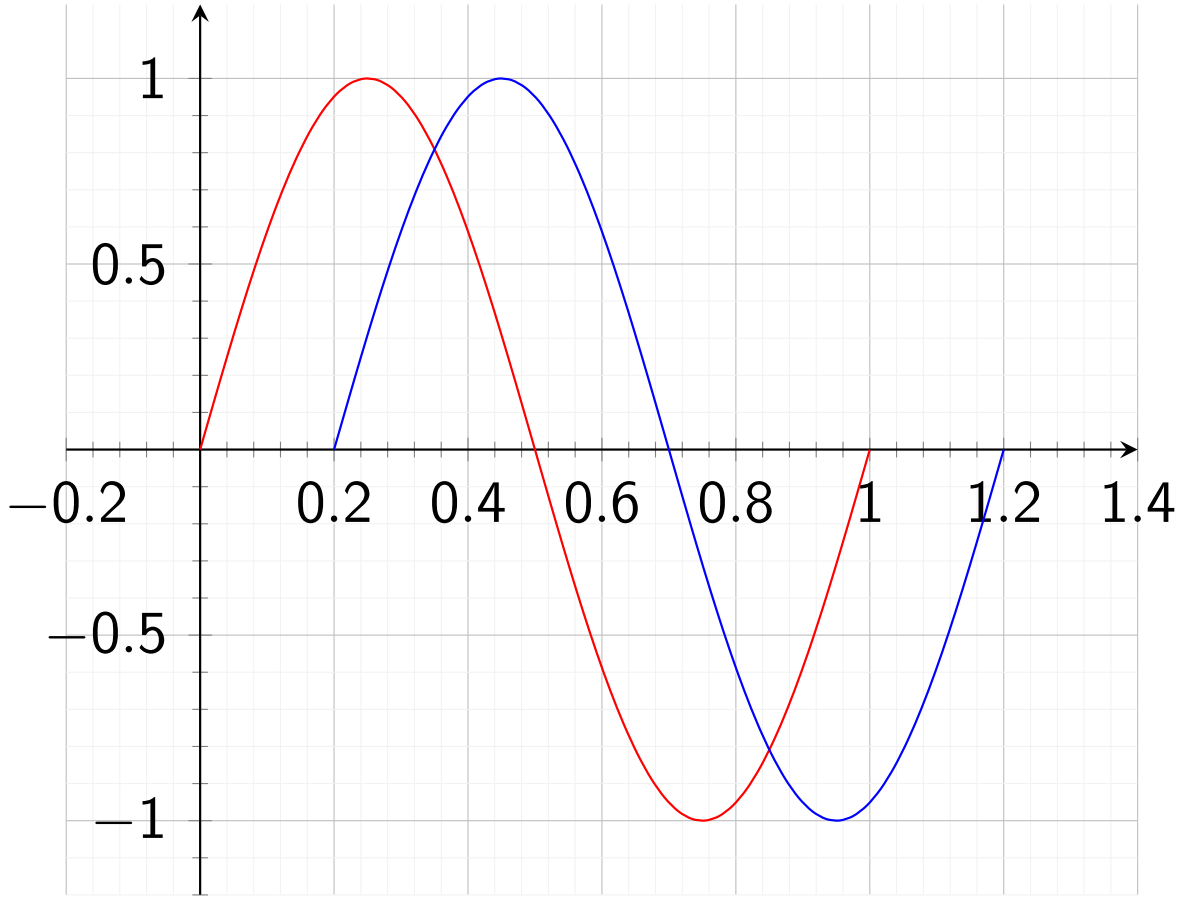
Attenuation



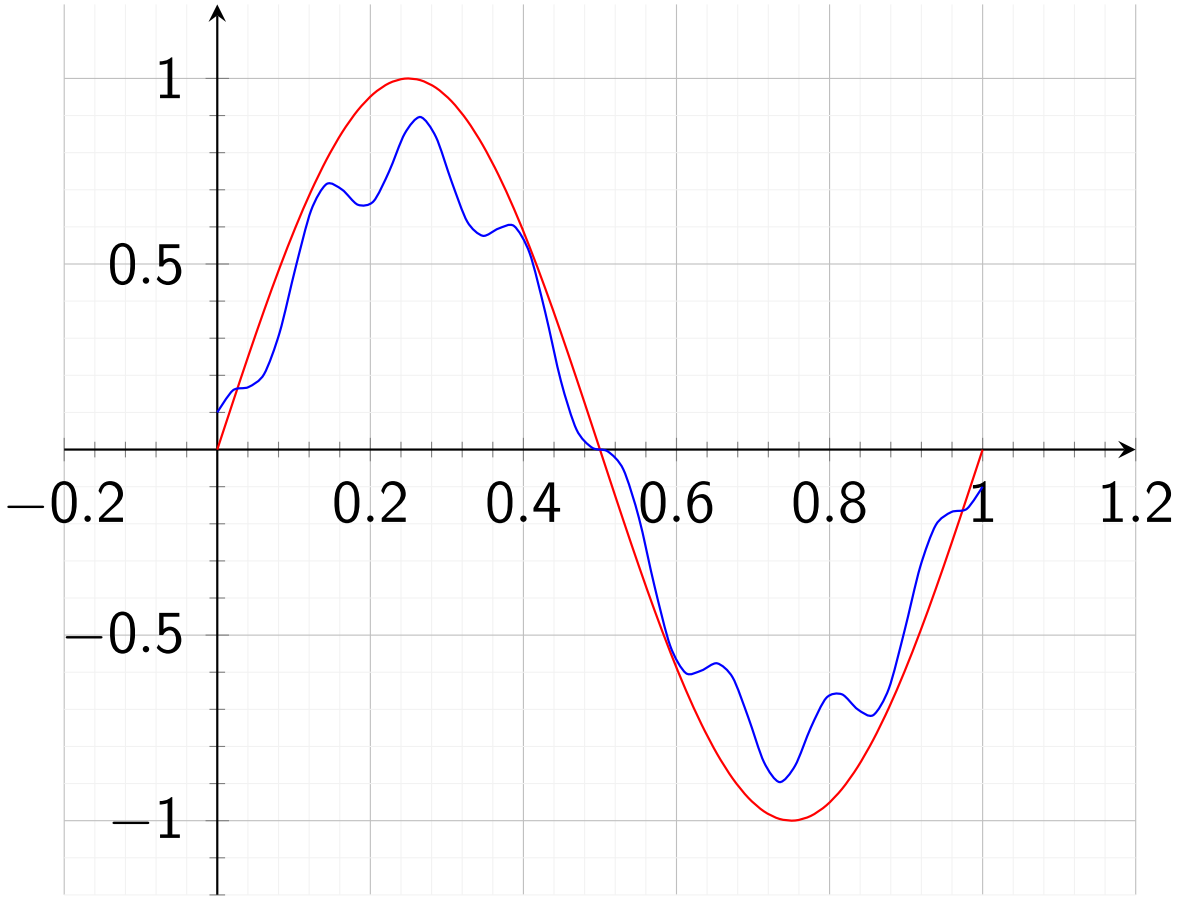
Amplification



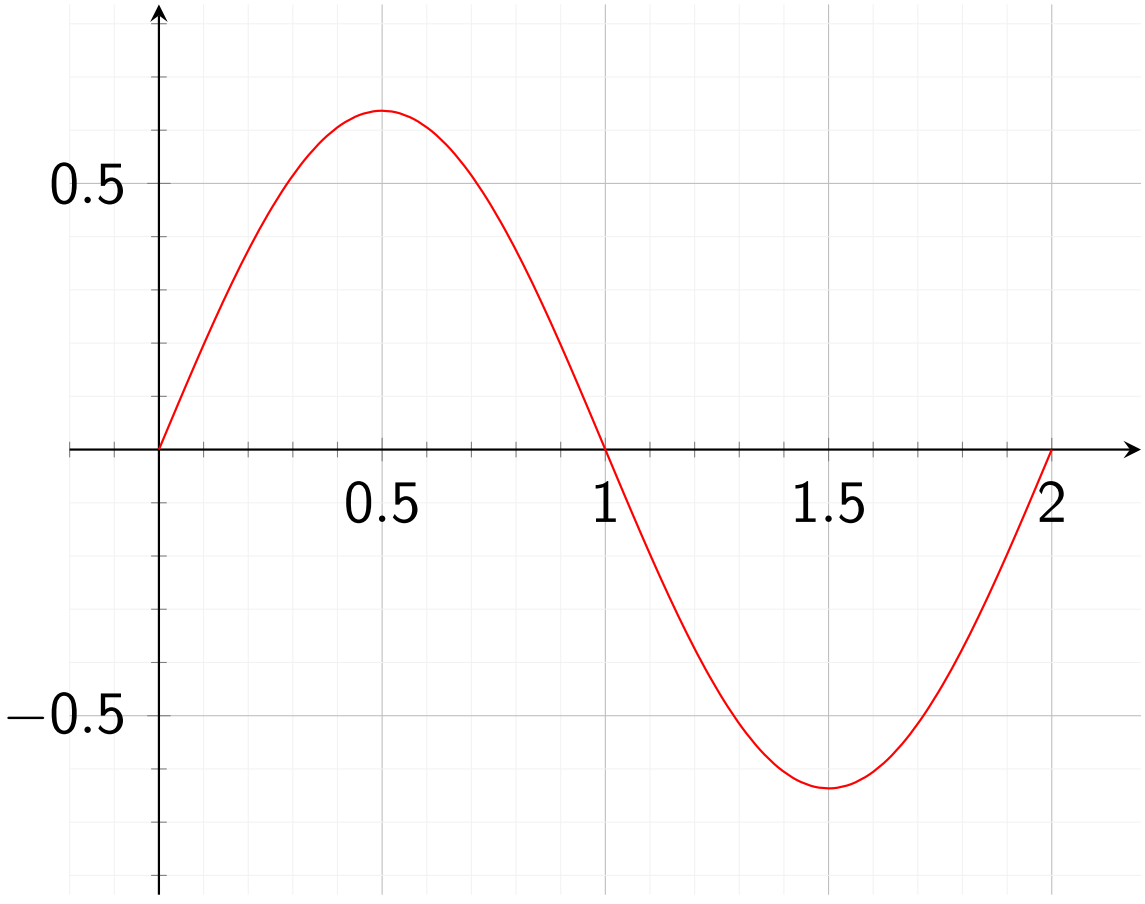
Delay



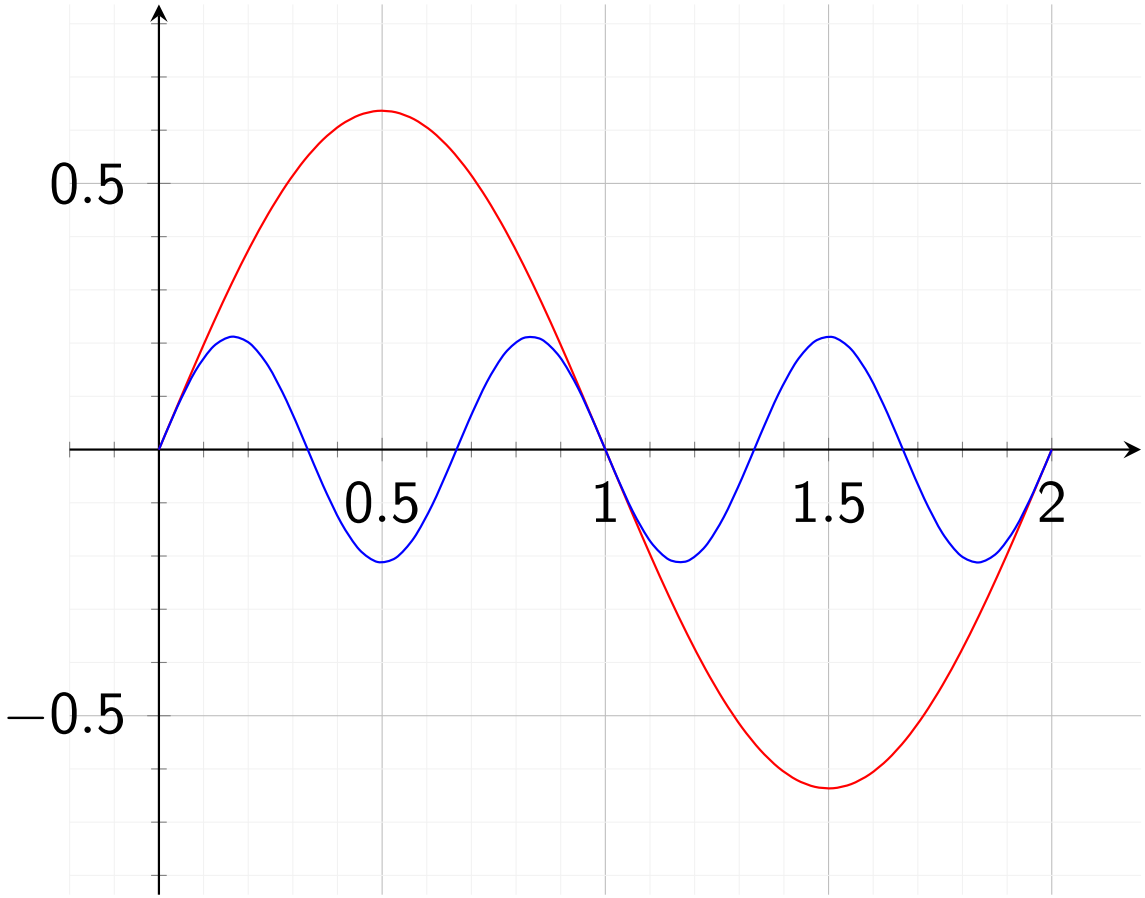
Noise



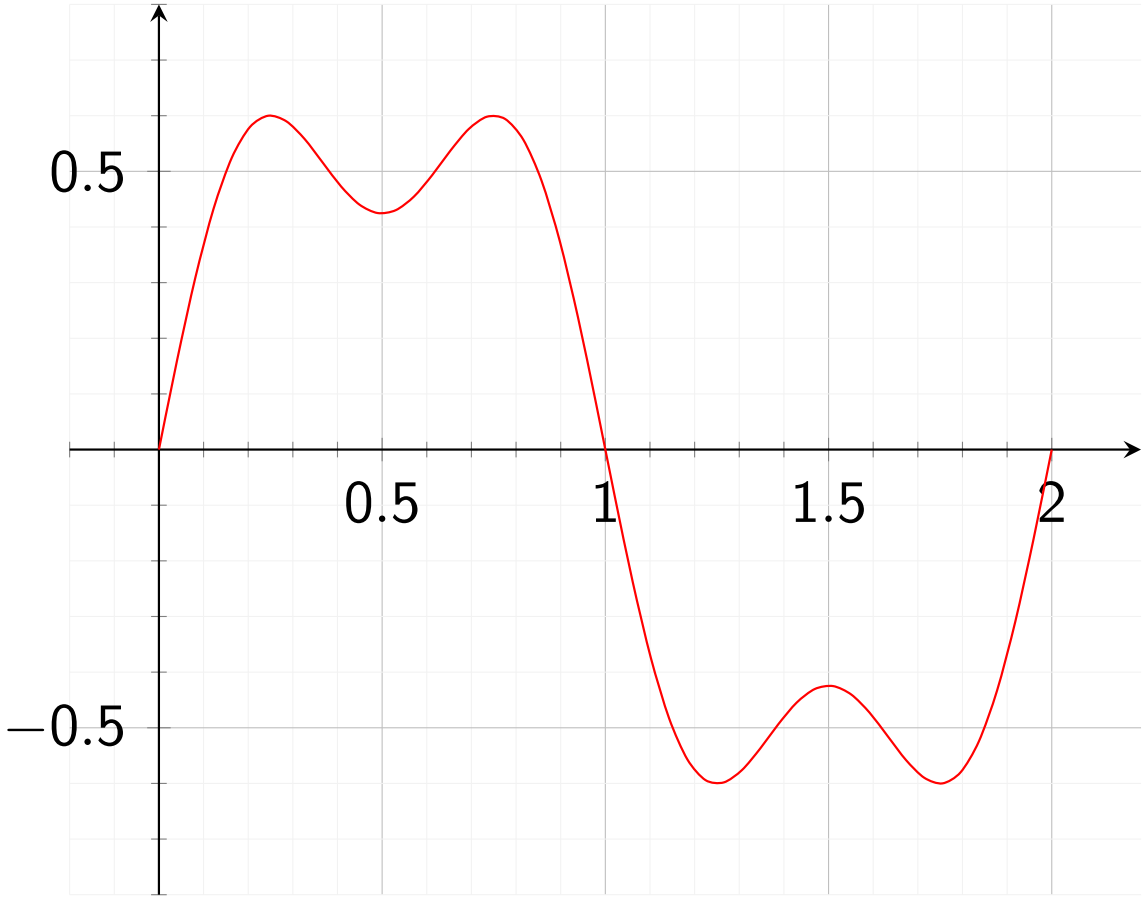
$\frac{2}{\pi} sin(x)$



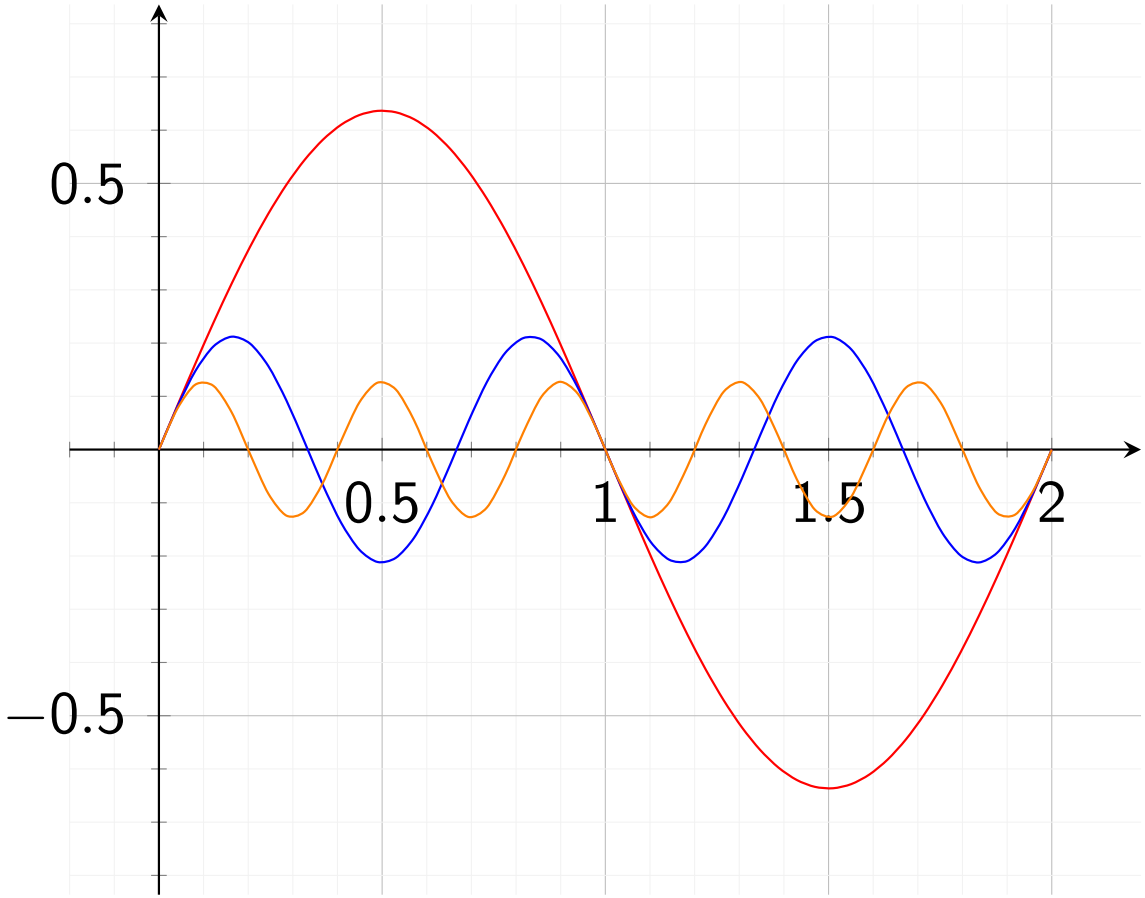
$\frac{2}{\pi} sin(x)$ and $\frac{2}{3\pi} sin(3x)$



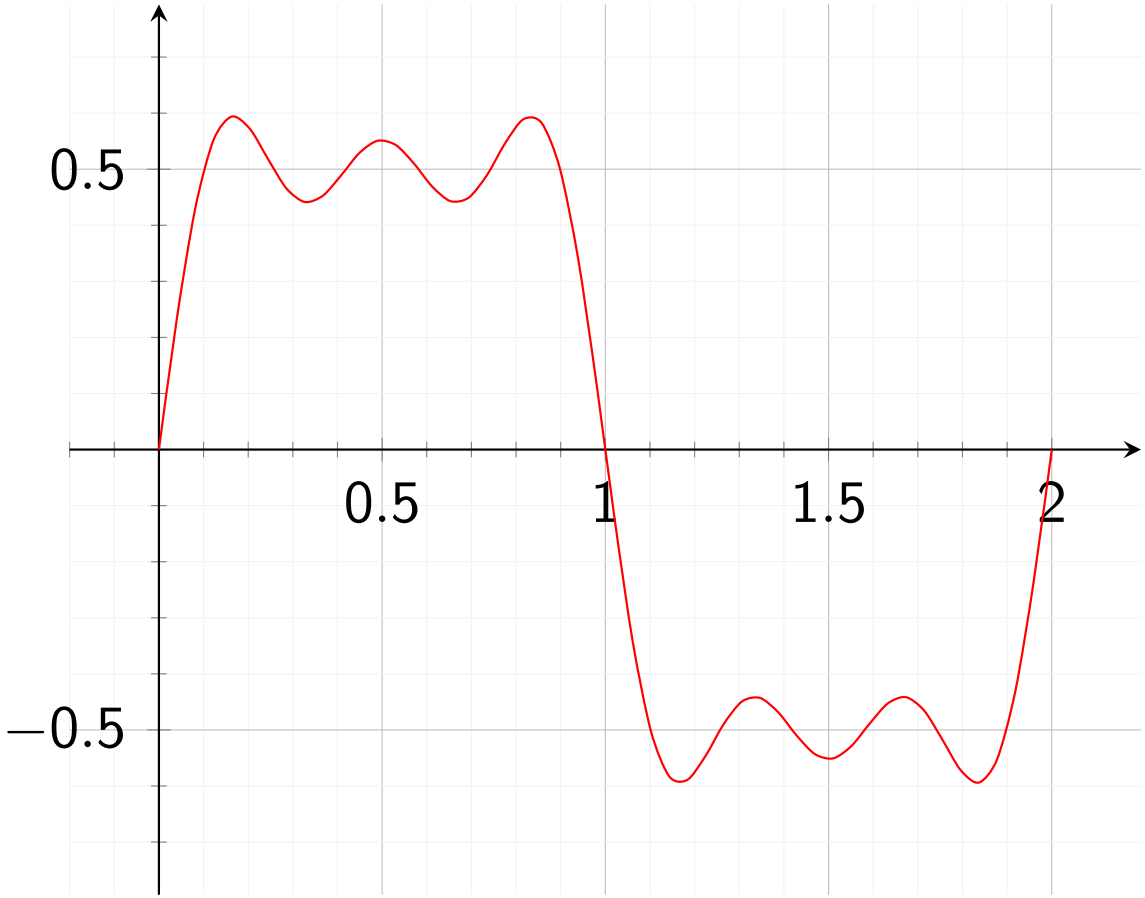
$\frac{2}{\pi}sin(x) + \frac{2}{3\pi}sin(3x)$



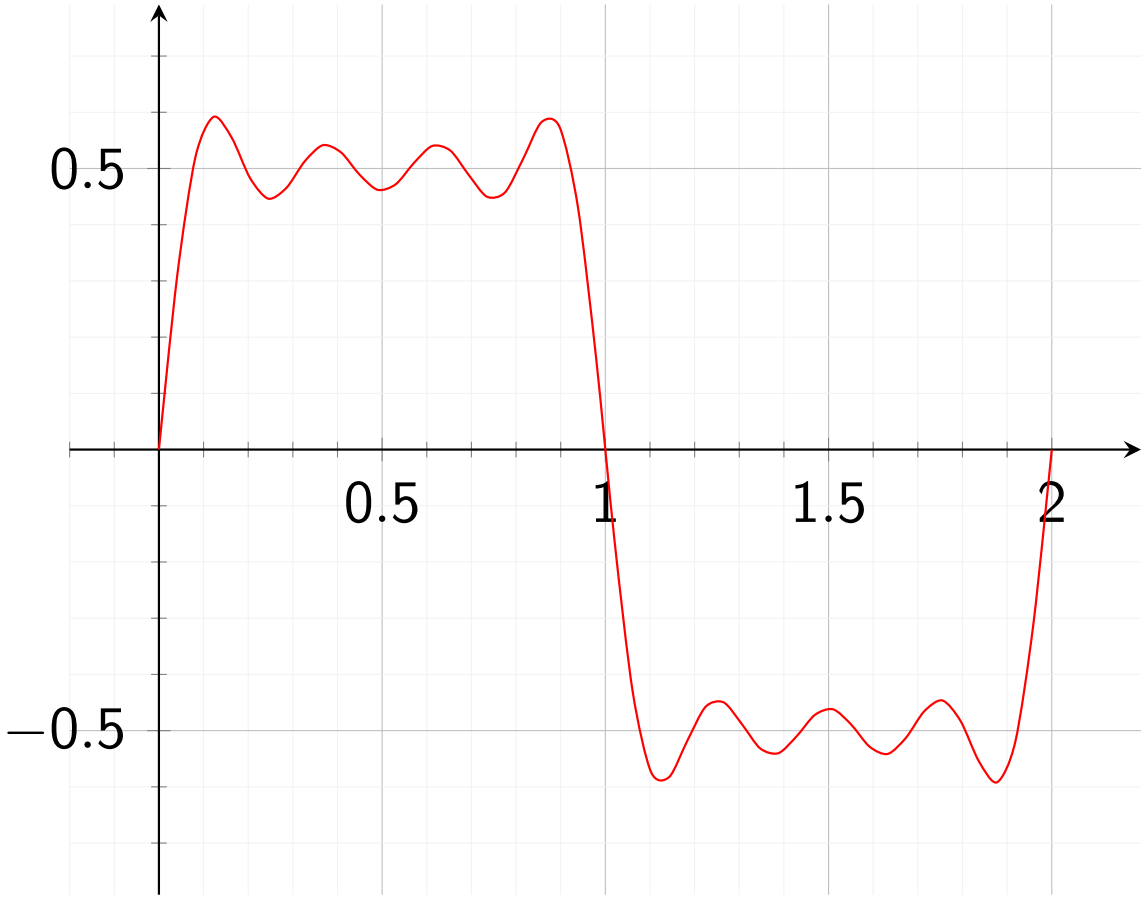
$\frac{2}{\pi}sin(x)$ and $\frac{2}{3\pi}sin(3x)$ and $\frac{2}{5\pi}sin(5x)$



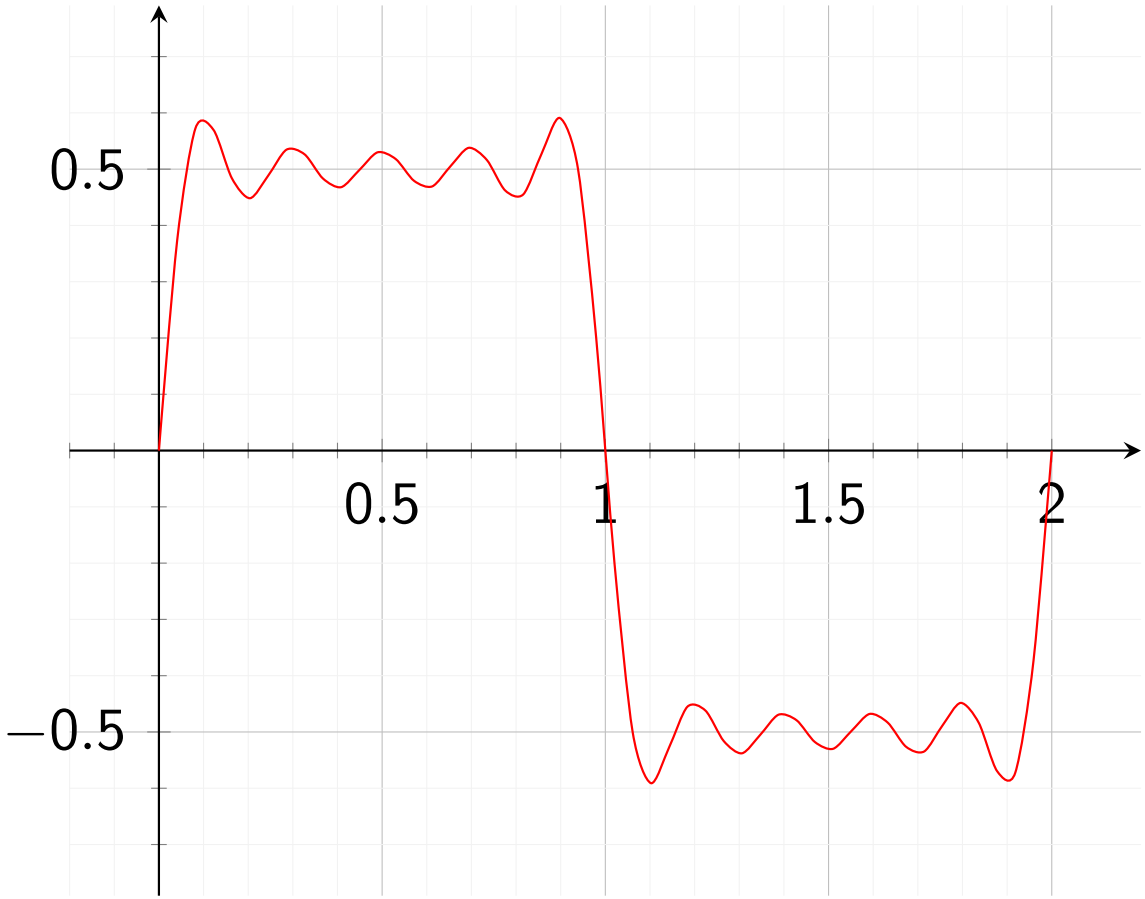
$$\frac{2}{\pi}sin(x) + \frac{2}{3\pi}sin(3x) + \frac{2}{5\pi}sin(5x)$$



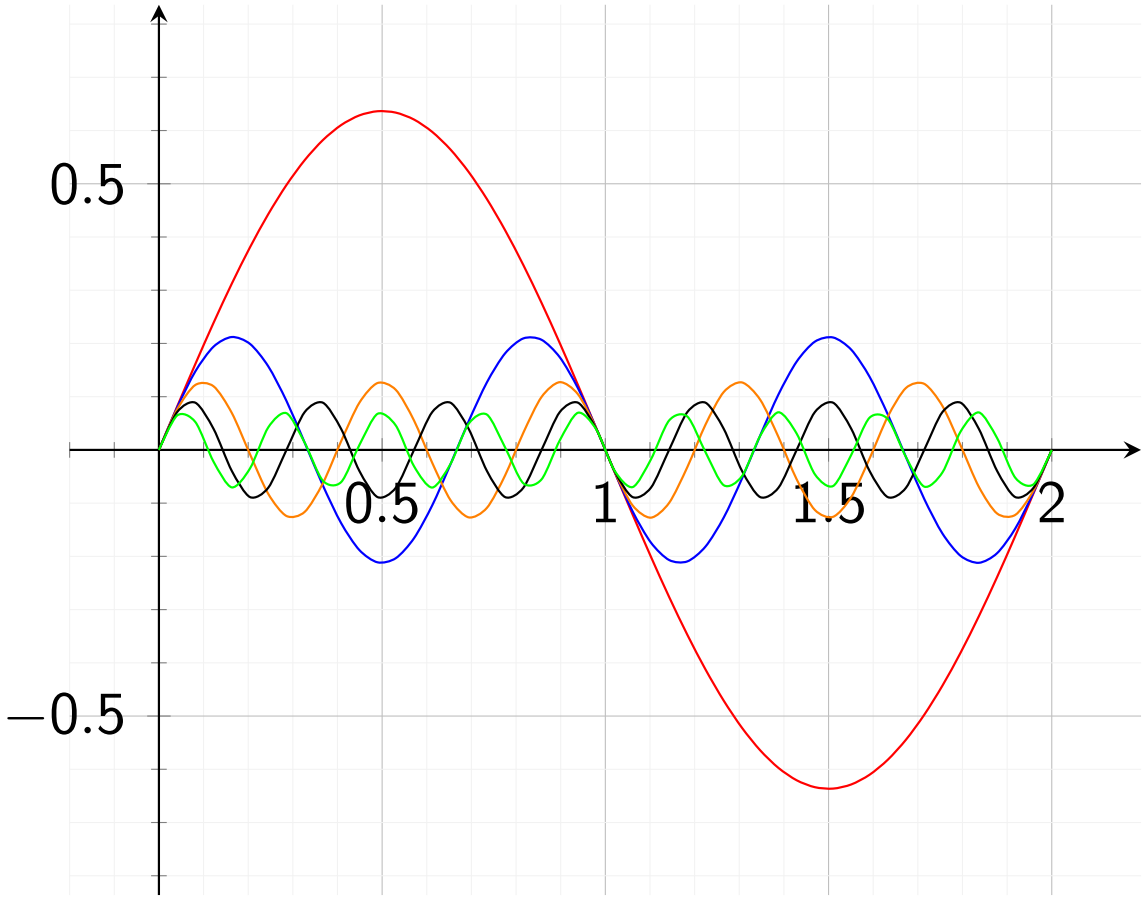
$$\frac{2}{\pi}sin(x) + \frac{2}{3\pi}sin(3x) + \frac{2}{5\pi}sin(5x) + \frac{2}{7\pi}sin(7x)$$



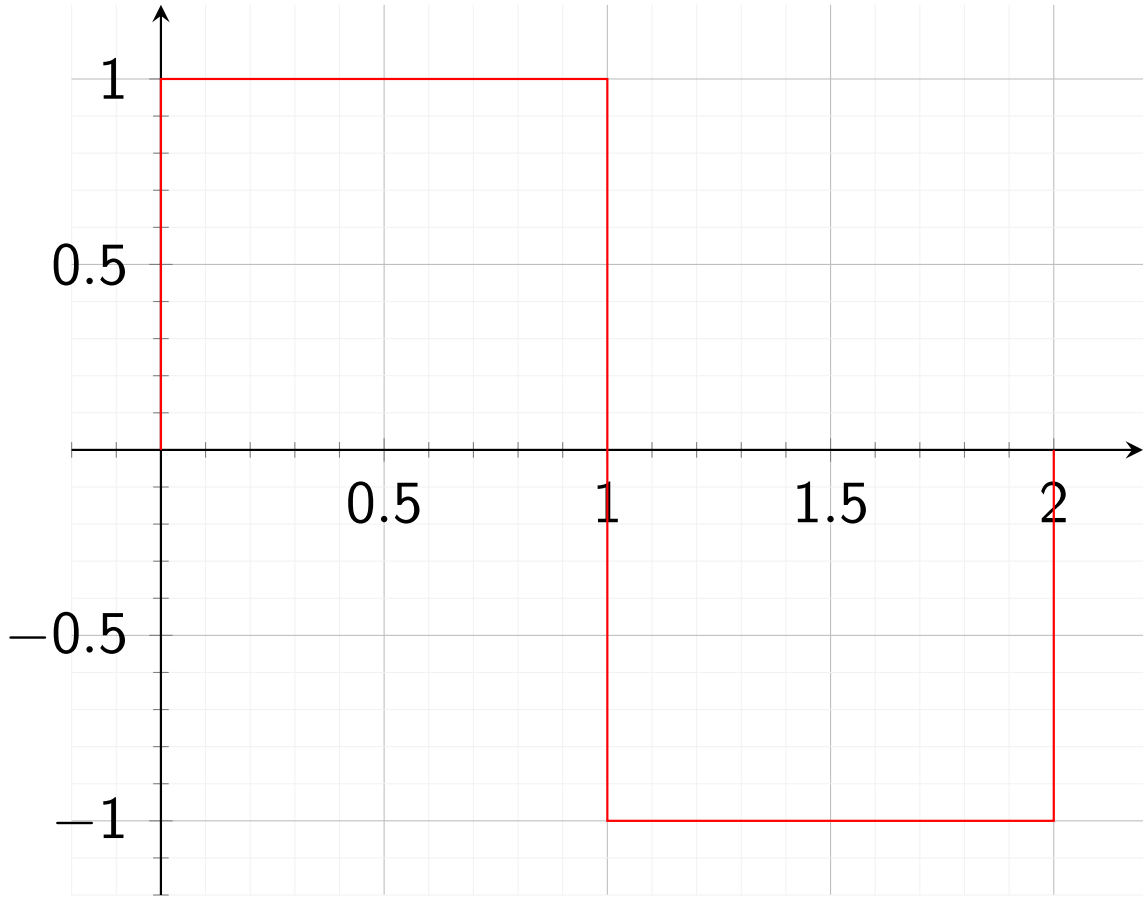
$$\frac{2}{\pi}sin(x) + \frac{2}{3\pi}sin(3x) + \frac{2}{5\pi}sin(5x) + \frac{2}{7\pi}sin(7x) + \frac{2}{9\pi}sin(9x)$$



$\frac{2}{\pi}sin(x)$ and $\frac{2}{3\pi}sin(3x)$ and $\frac{2}{5\pi}sin(5x)$ and $\frac{2}{7\pi}sin(7x)$ and $\frac{2}{9\pi}sin(9x)$



$\frac{2}{\pi}sin(x) + \frac{2}{3\pi}sin(3x) + \frac{2}{5\pi}sin(5x) + \frac{2}{7\pi}sin(7x) + \frac{2}{9\pi}sin(9x) + \frac{2}{11\pi}sin(11x) + \frac{2}{13\pi}sin(13x) \ldots \to \infty$

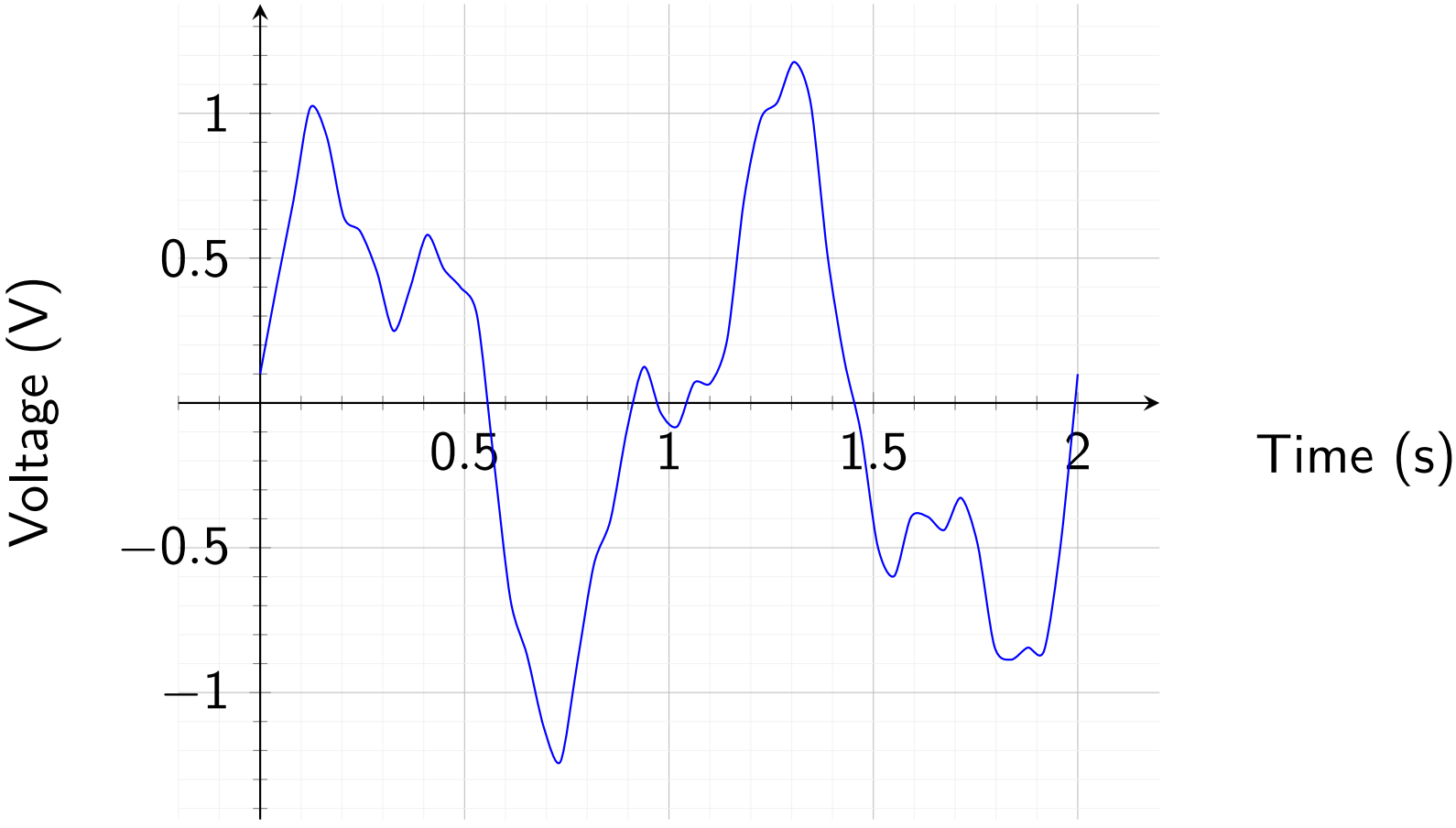


Fourier Transform

"In mathematics, a Fourier transform (FT) is a mathematical transform that decomposes a function (often a function of time, or a signal) into its constituent frequencies ... "

Wikipedia

Analog Signal



Digital Signal