

Sine

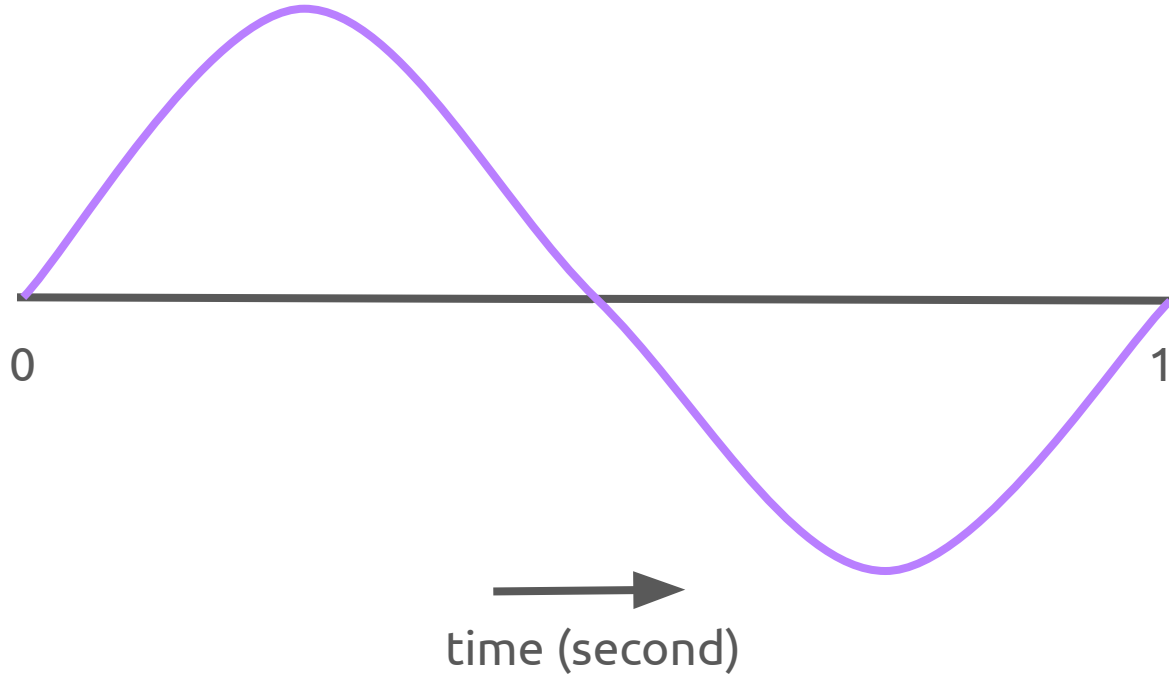
- function
- continuous- \rightarrow discrete time domain
- phase

Sine

function

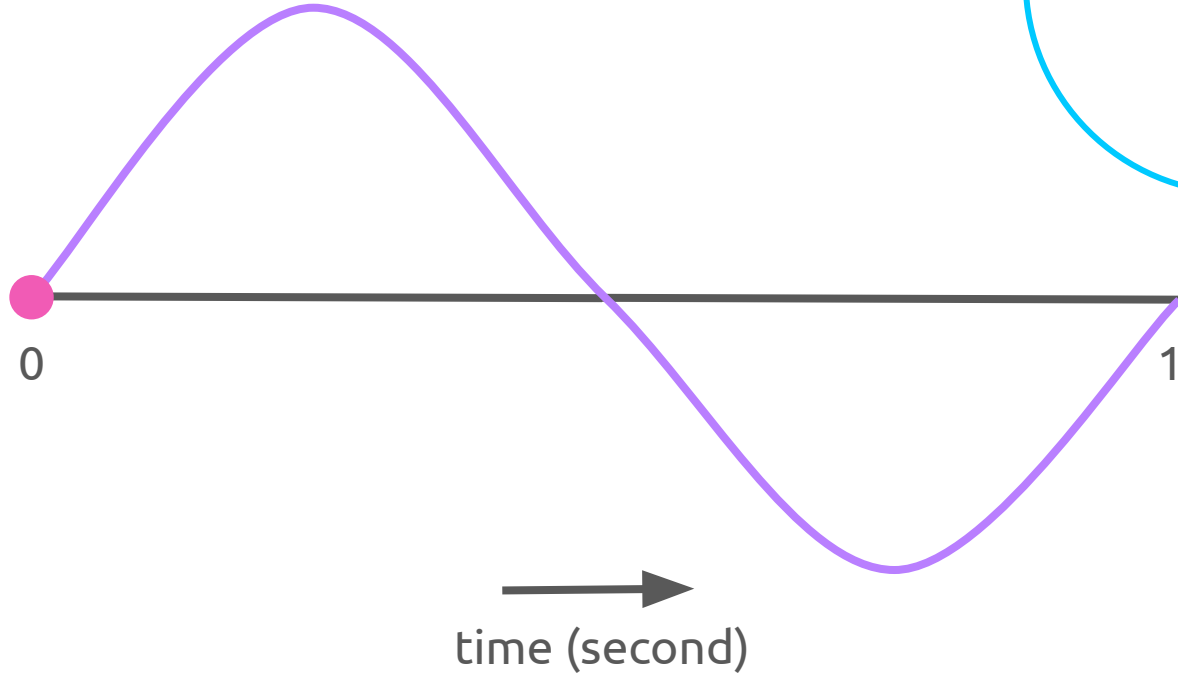
Sine in continuous time

- frequency = 1
- wavelength = 1 second



Sine in continuous time

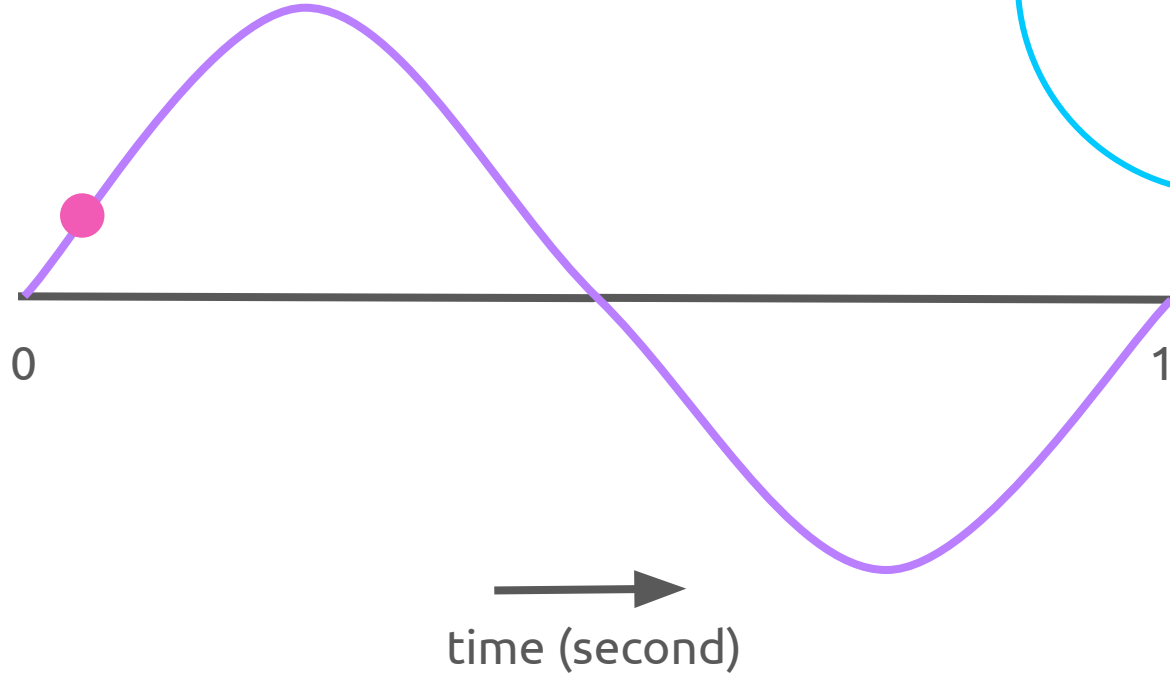
- frequency = 1
- wavelength = 1 second



0

Sine in continuous time

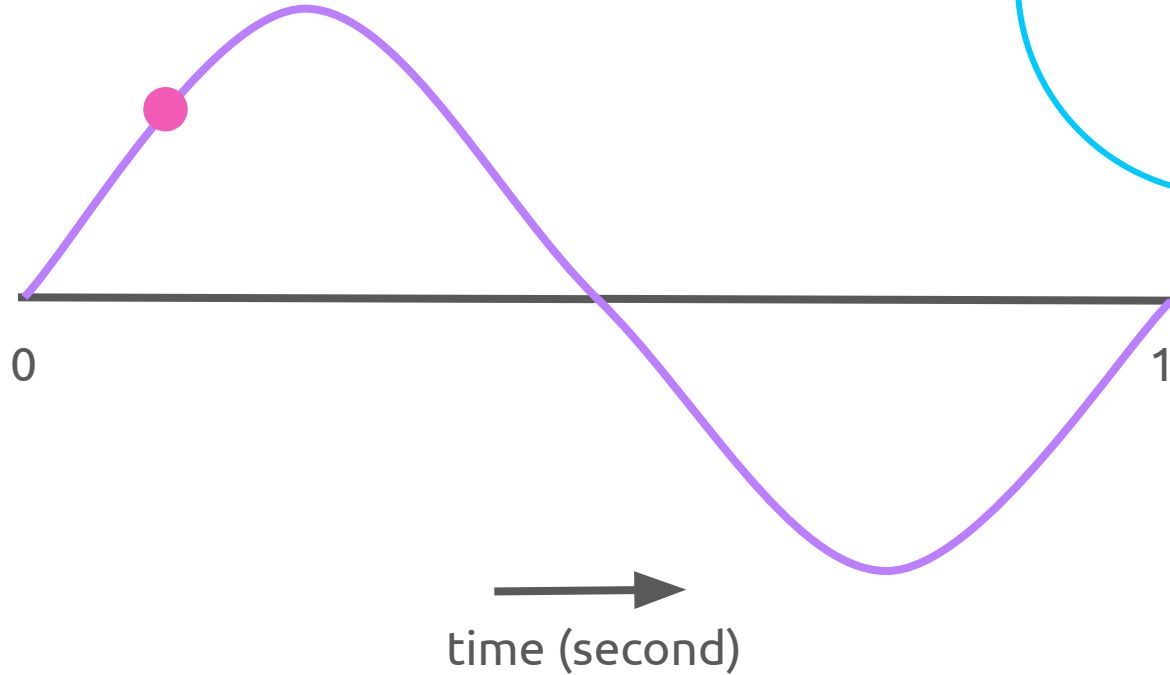
- frequency = 1
- wavelength = 1 second



$\frac{1}{8} \pi$

Sine in continuous time

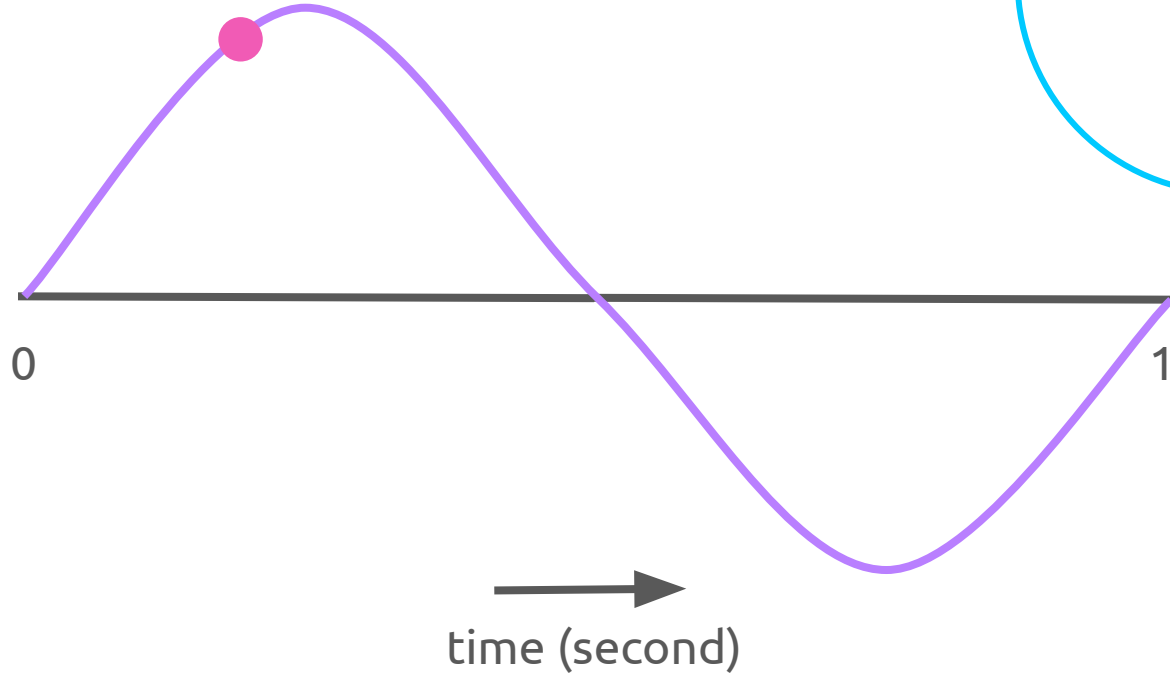
- frequency = 1
- wavelength = 1 second



$\frac{1}{4} \pi$

Sine in continuous time

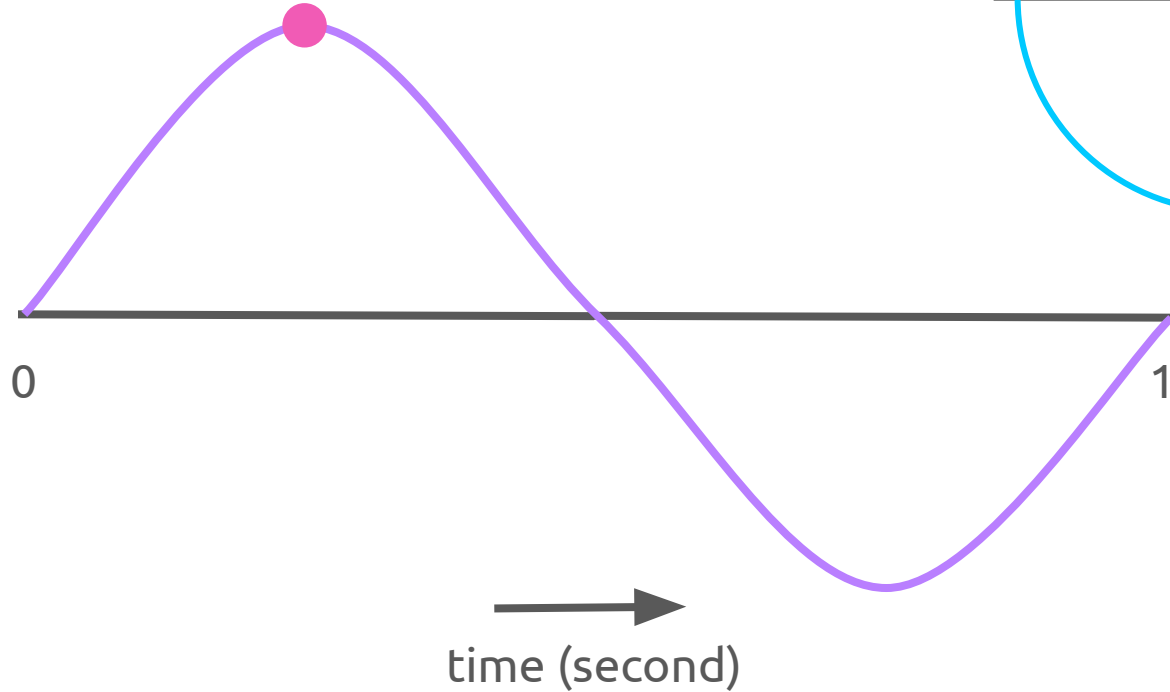
- frequency = 1
- wavelength = 1 second



$\frac{3}{8}\pi$

Sine in continuous time

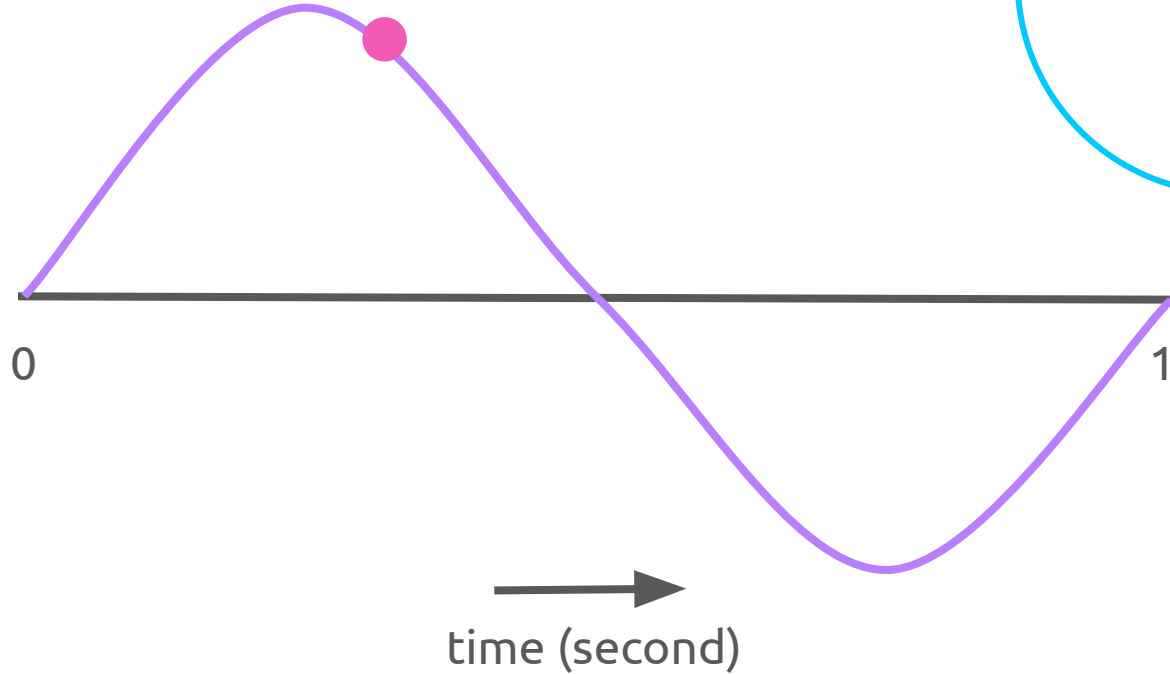
- frequency = 1
- wavelength = 1 second



$\frac{1}{2}\pi$

Sine in continuous time

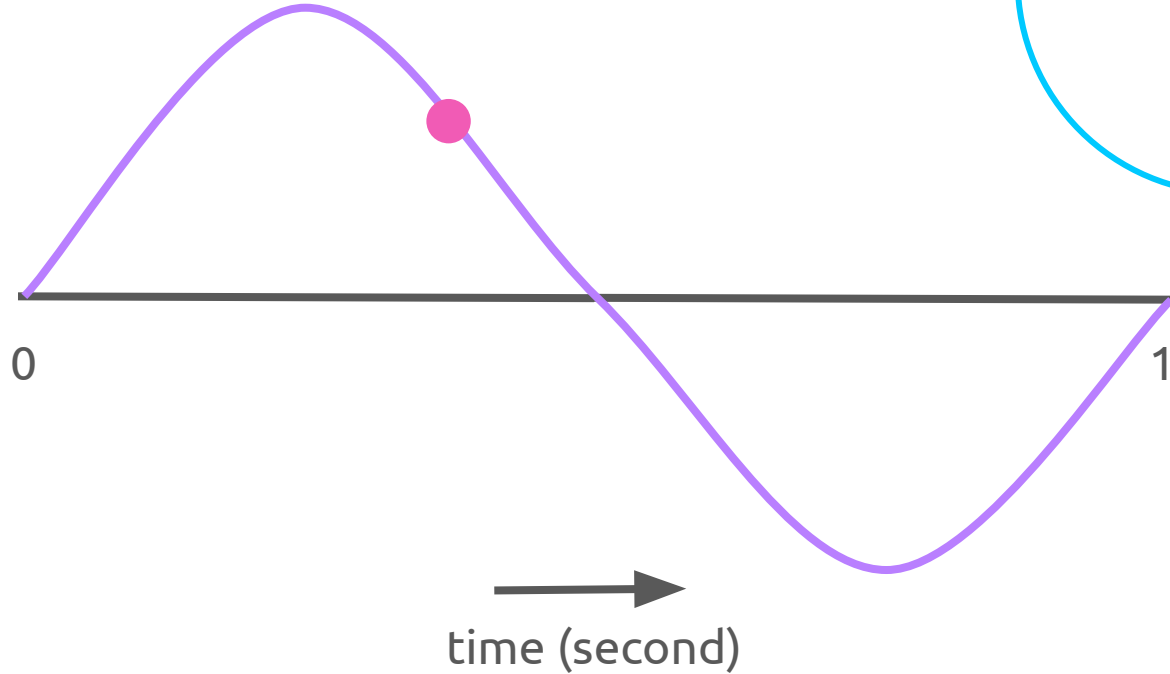
- frequency = 1
- wavelength = 1 second



$\frac{5}{8} \pi$

Sine in continuous time

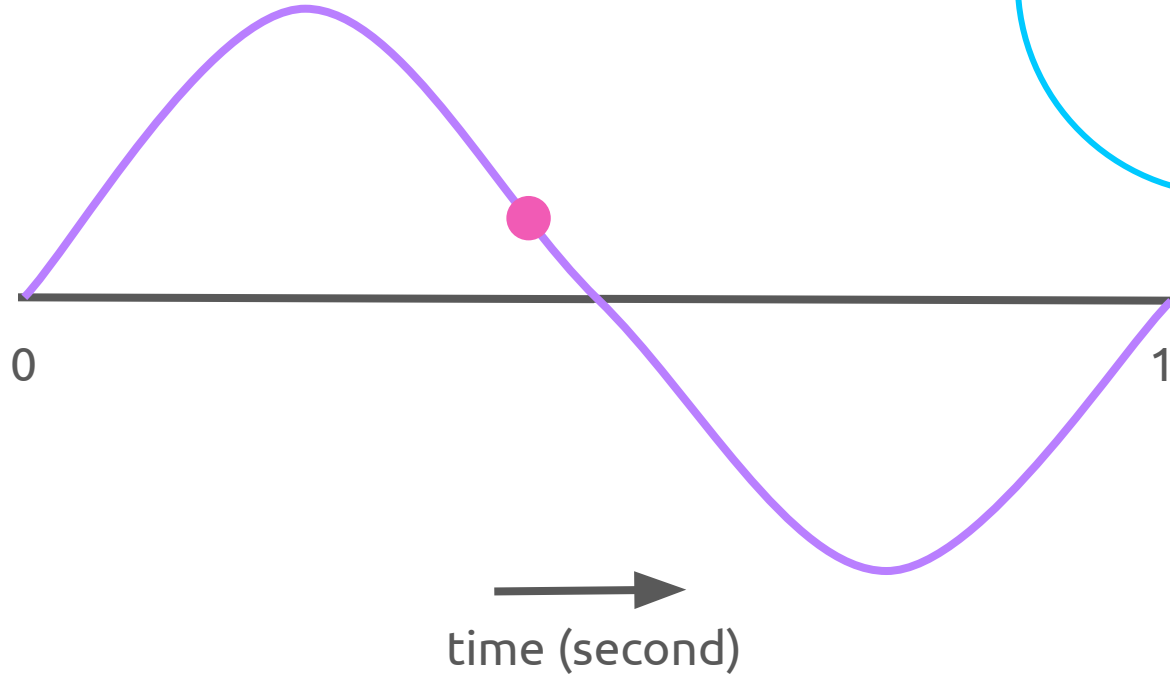
- frequency = 1
- wavelength = 1 second



$\frac{3}{4} \pi$

Sine in continuous time

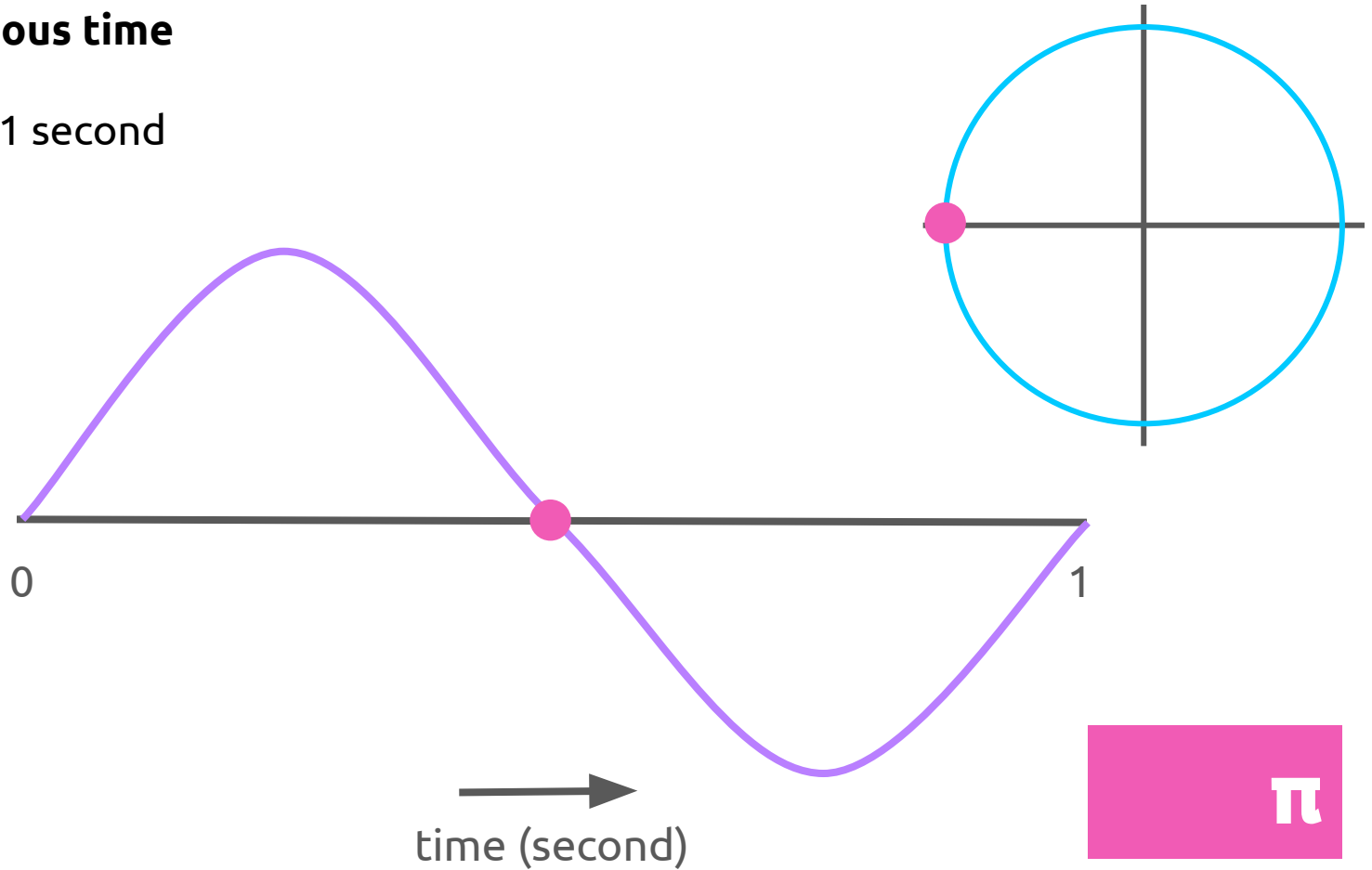
- frequency = 1
- wavelength = 1 second



$\frac{7}{8} \pi$

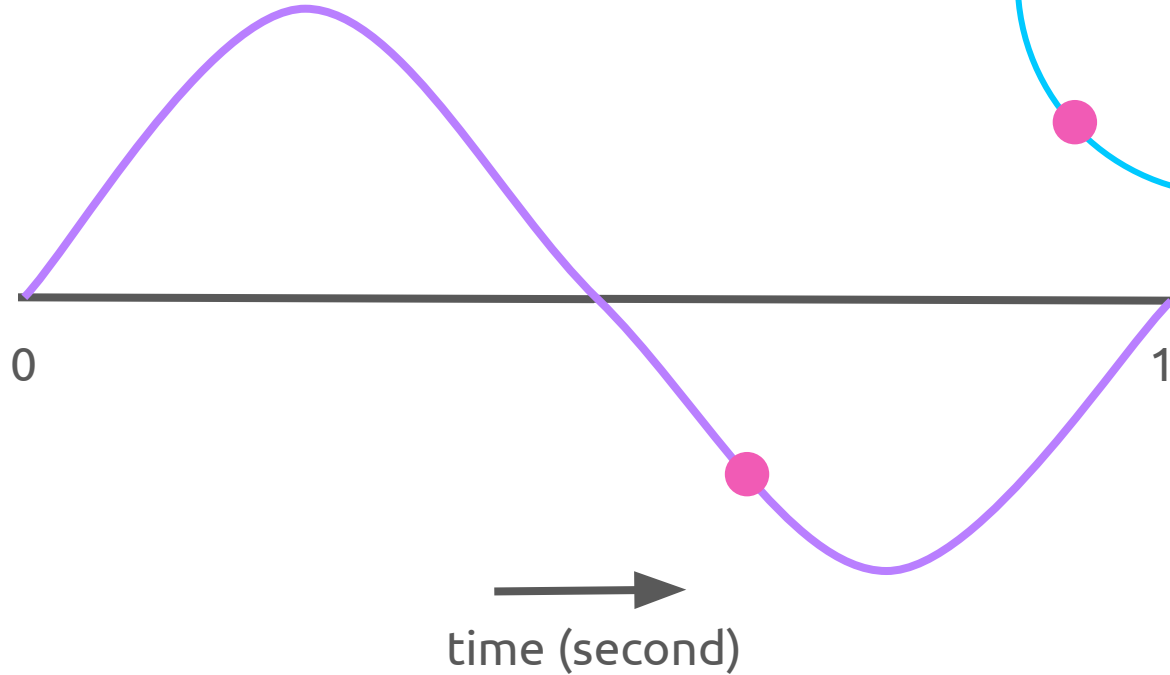
Sine in continuous time

- frequency = 1
- wavelength = 1 second



Sine in continuous time

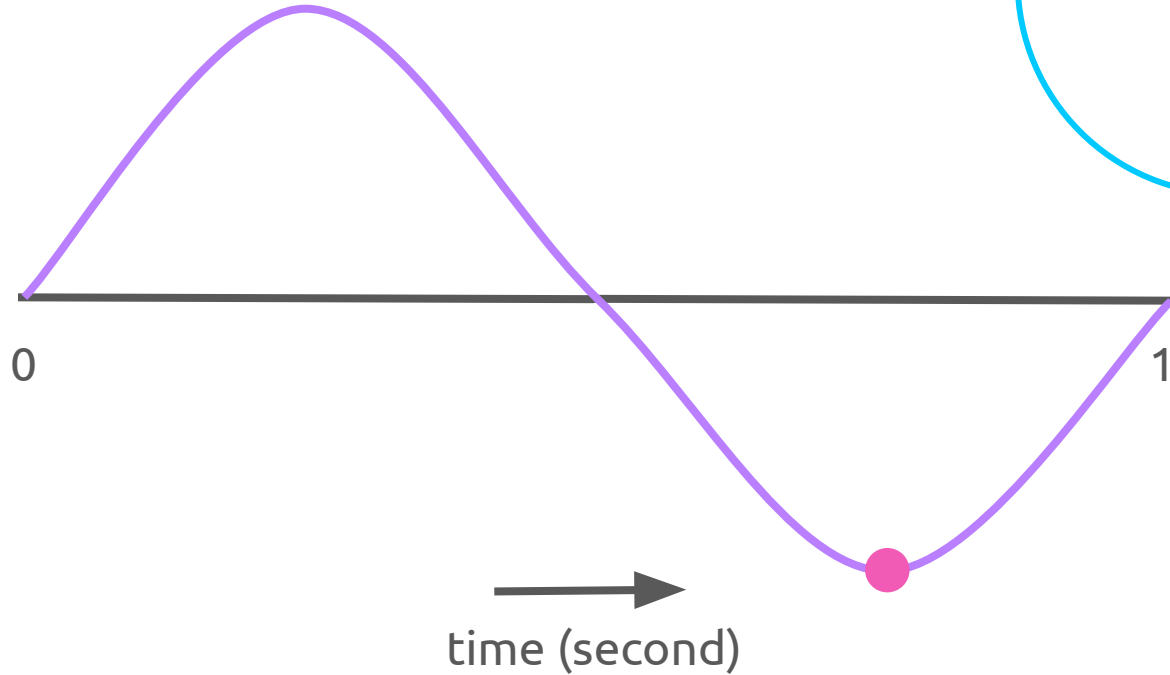
- frequency = 1
- wavelength = 1 second



$1\frac{1}{4}\pi$

Sine in continuous time

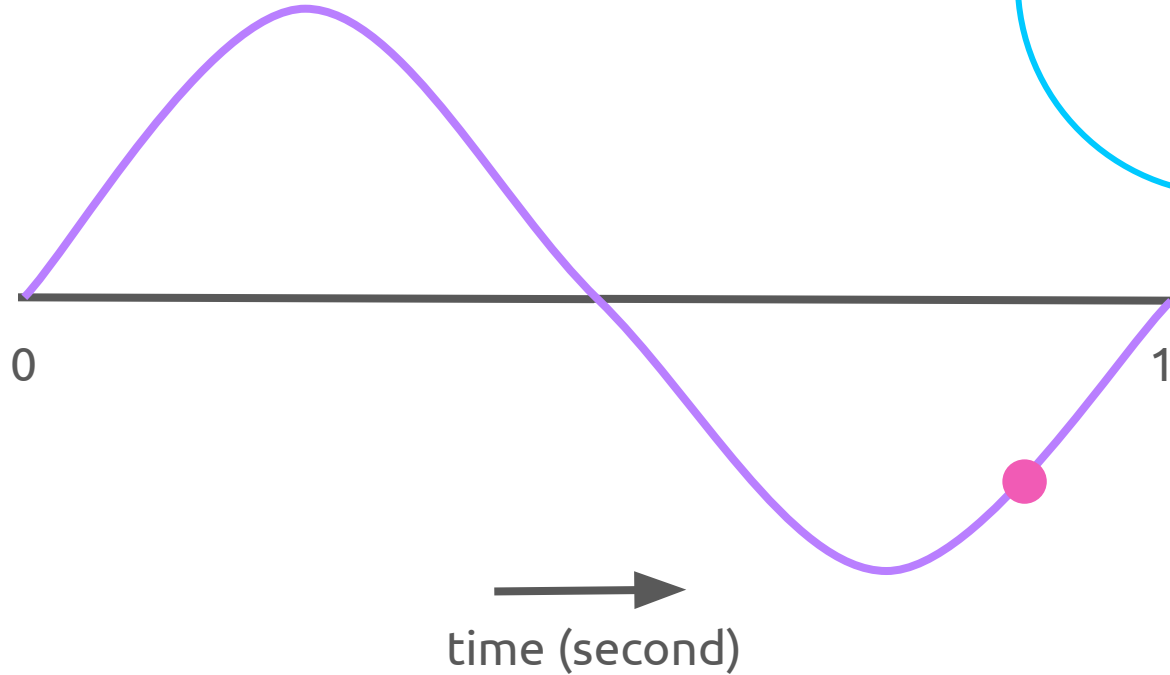
- frequency = 1
- wavelength = 1 second



$1\frac{1}{2}\pi$

Sine in continuous time

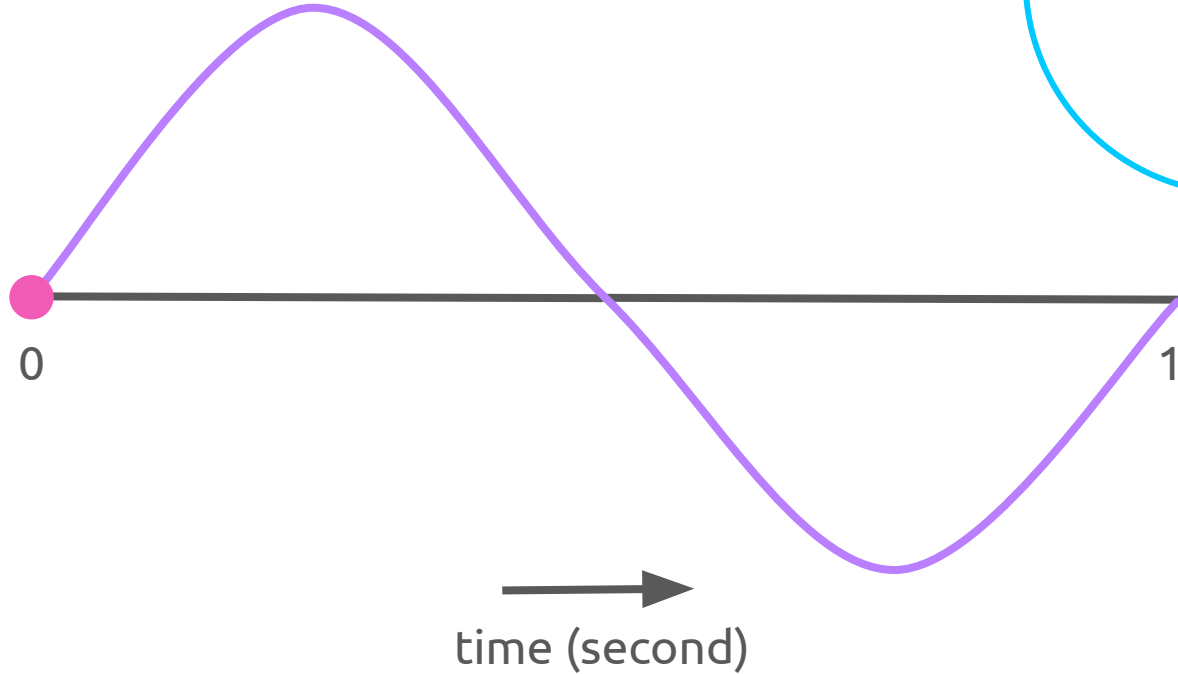
- frequency = 1
- wavelength = 1 second



$1\frac{3}{4}\pi$

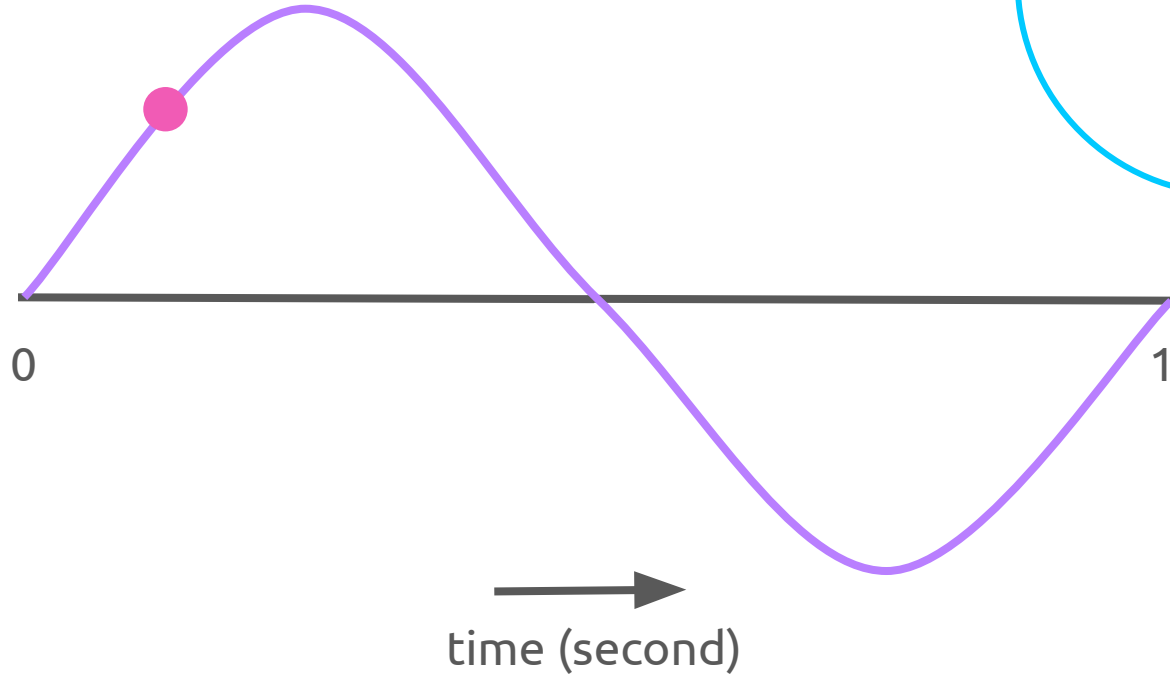
Sine in continuous time

- frequency = 1
- wavelength = 1 second



Sine in continuous time

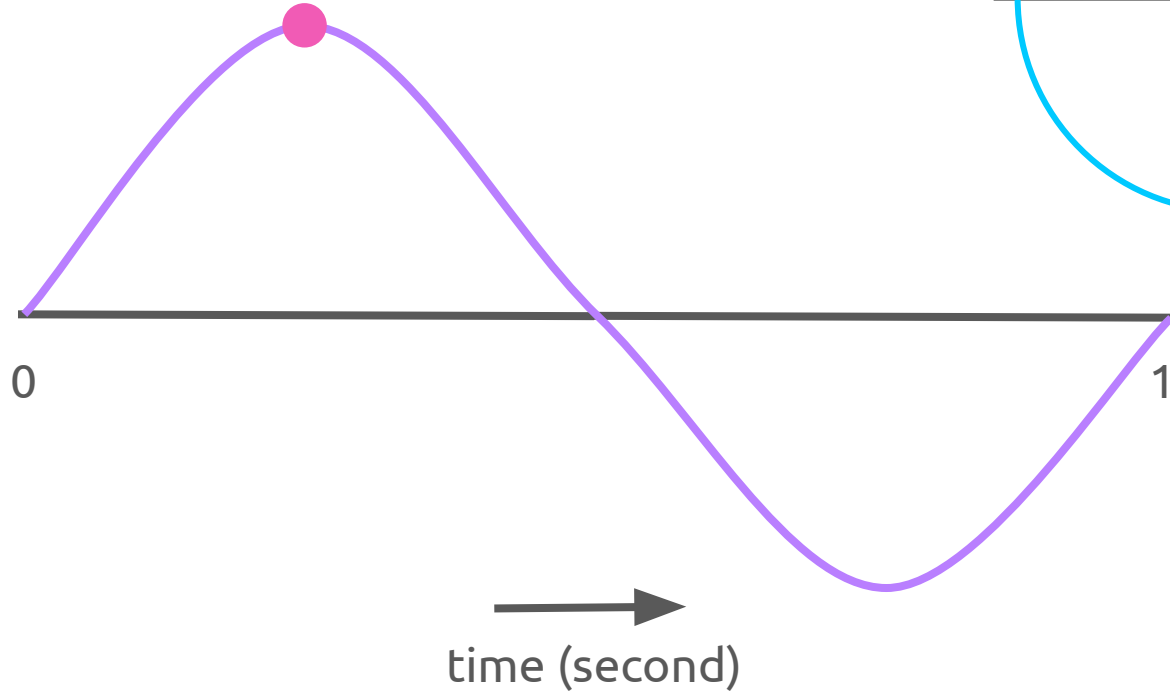
- frequency = 1
- wavelength = 1 second



$2\frac{1}{4} \pi$

Sine in continuous time

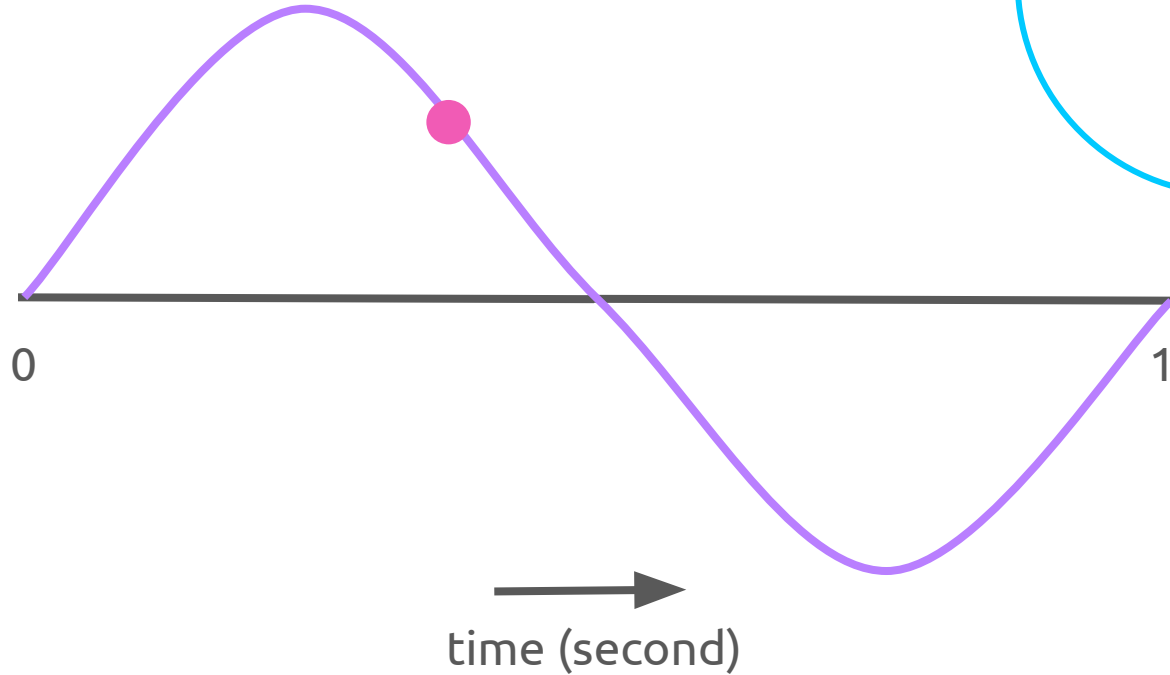
- frequency = 1
- wavelength = 1 second



$2\frac{1}{2} \pi$

Sine in continuous time

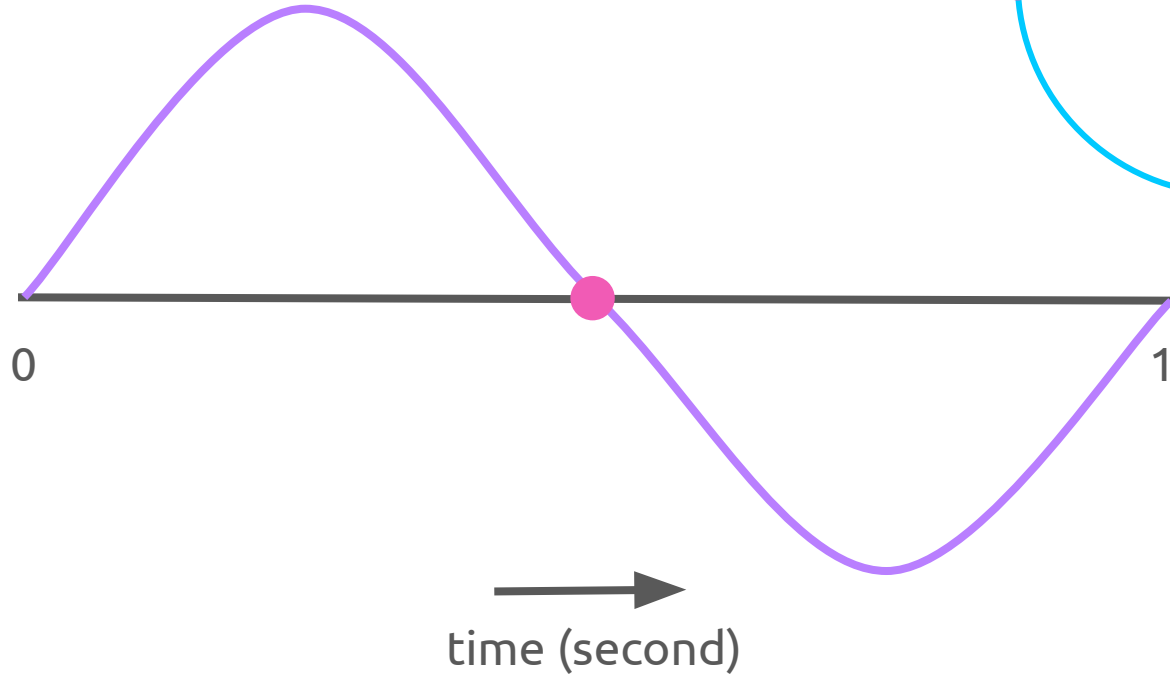
- frequency = 1
- wavelength = 1 second



$2\frac{3}{4} \pi$

Sine in continuous time

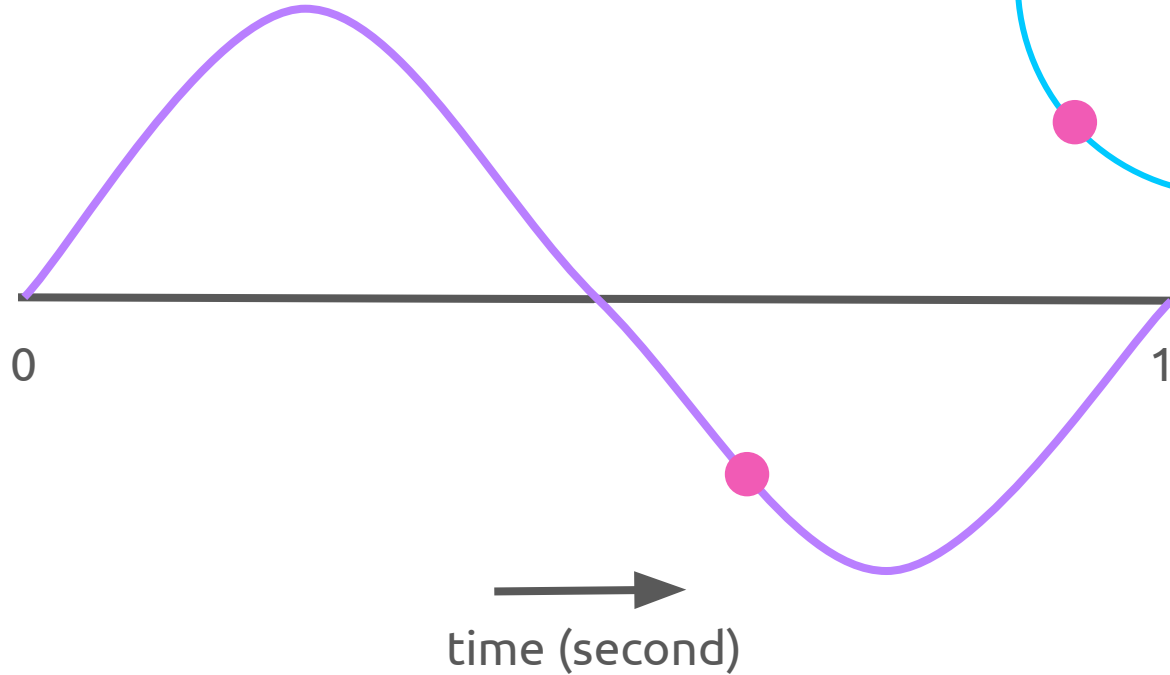
- frequency = 1
- wavelength = 1 second



3π

Sine in continuous time

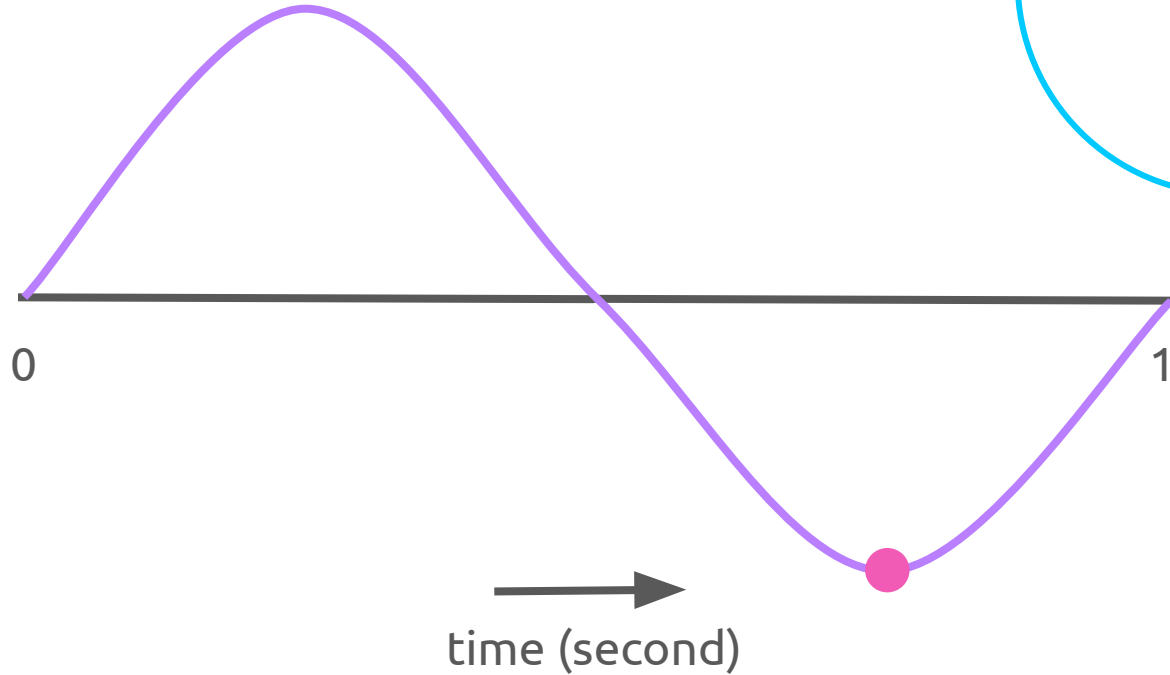
- frequency = 1
- wavelength = 1 second



$3\frac{1}{4} \pi$

Sine in continuous time

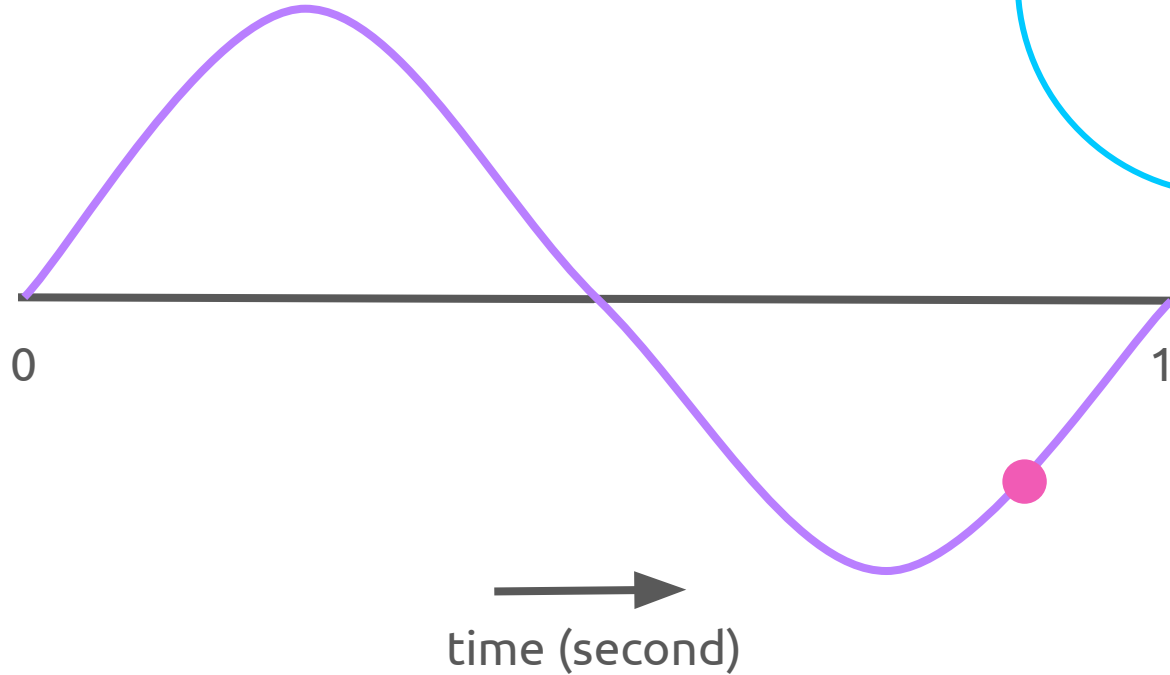
- frequency = 1
- wavelength = 1 second



$3\frac{1}{2}\pi$

Sine in continuous time

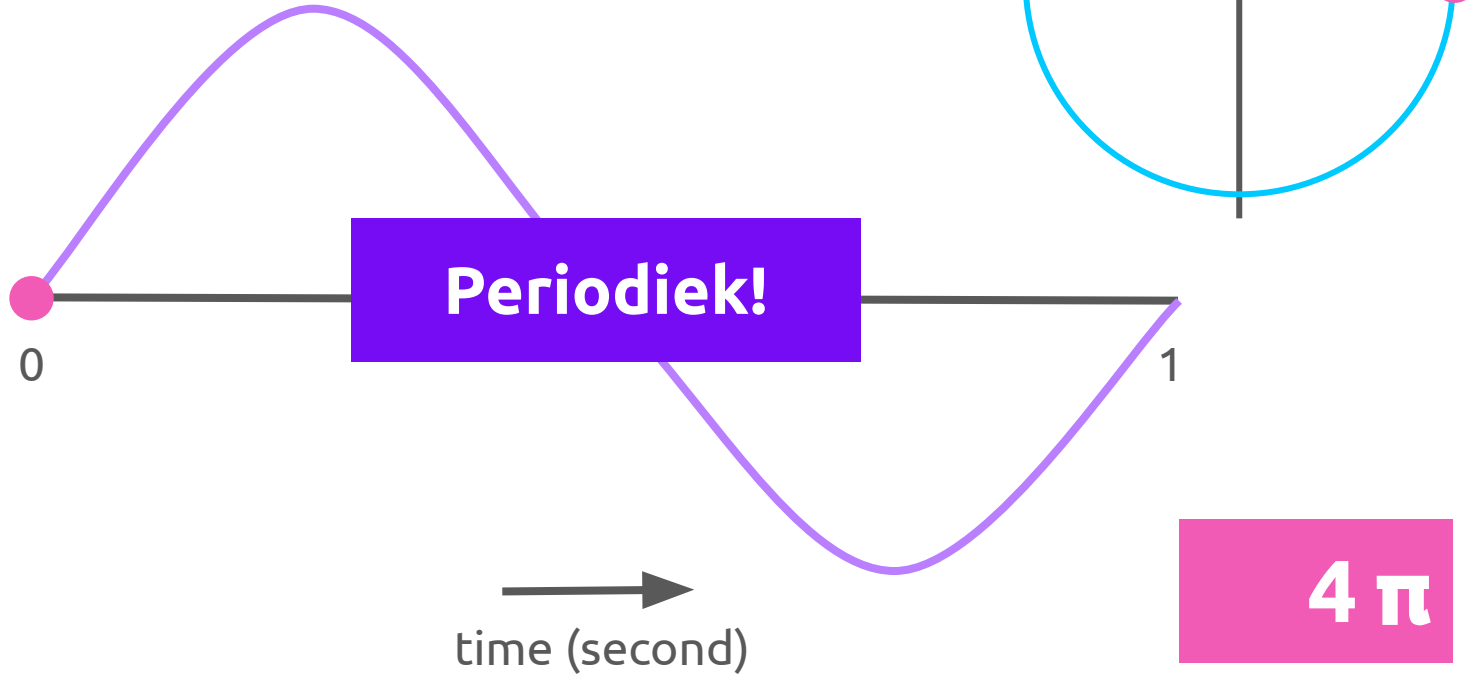
- frequency = 1
- wavelength = 1 second



$3\frac{3}{4}\pi$

Sine in continuous time

- frequency = 1
- wavelength = 1 second

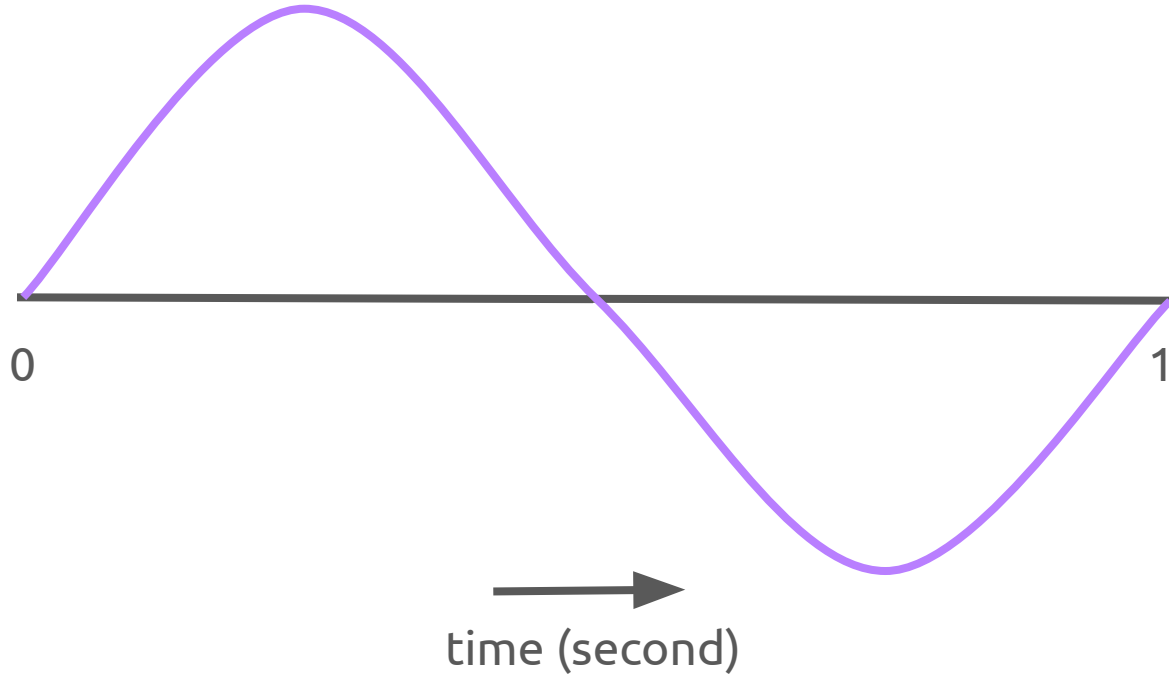


Sine

continuous- to discrete time domain

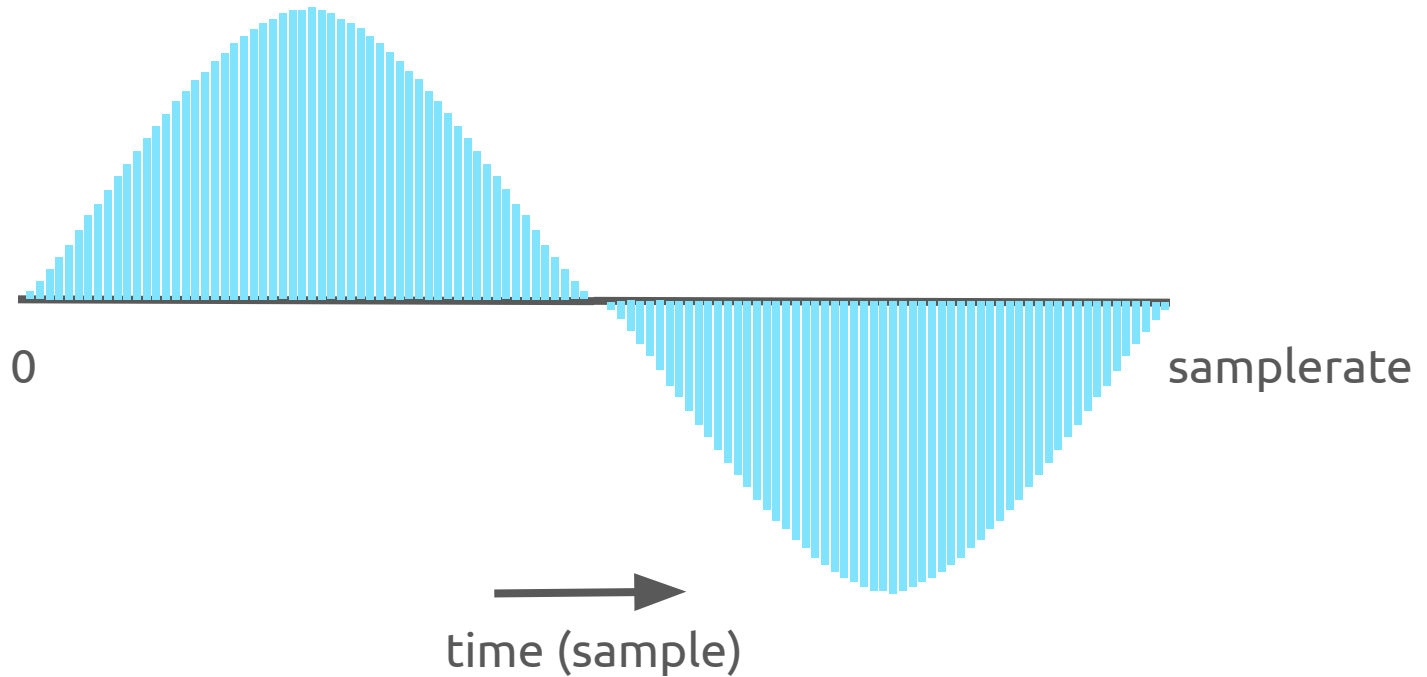
Sine in continuous time

- frequency = 1
- wavelength = 1 second



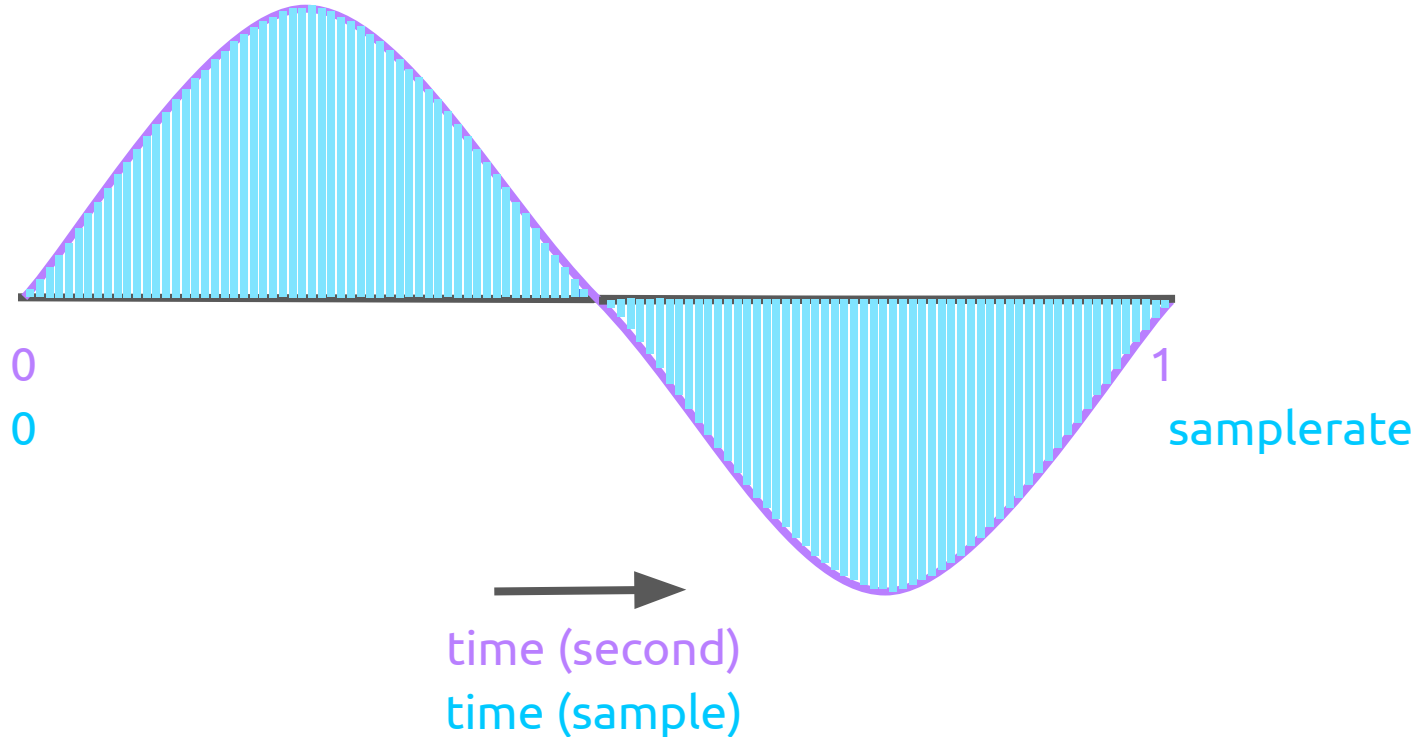
Sine in discrete time

- frequency = 1
- wavelength = 1 second \rightarrow samplerate



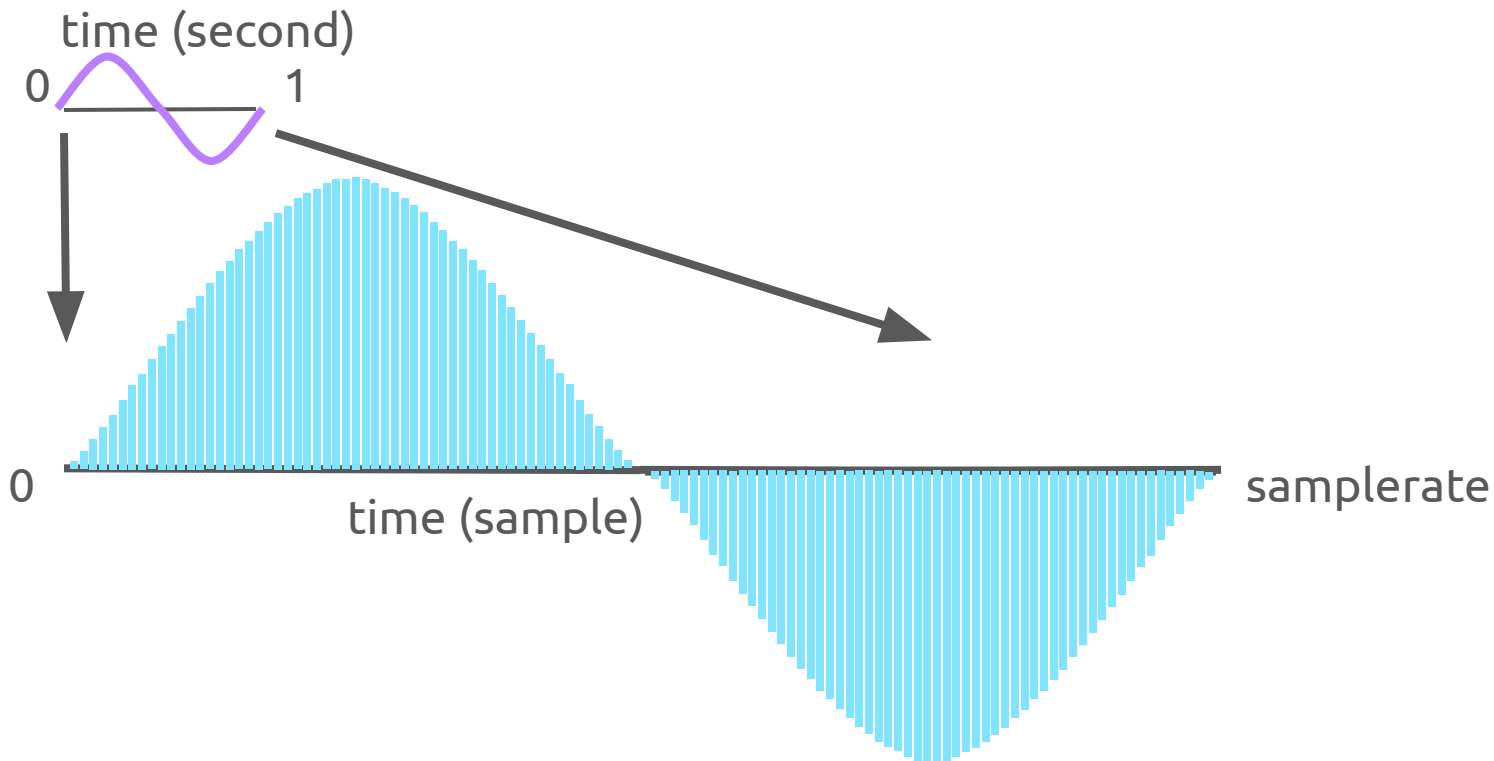
Sine in discrete time

- frequency = 1
- wavelength = 1 second \rightarrow samplerate



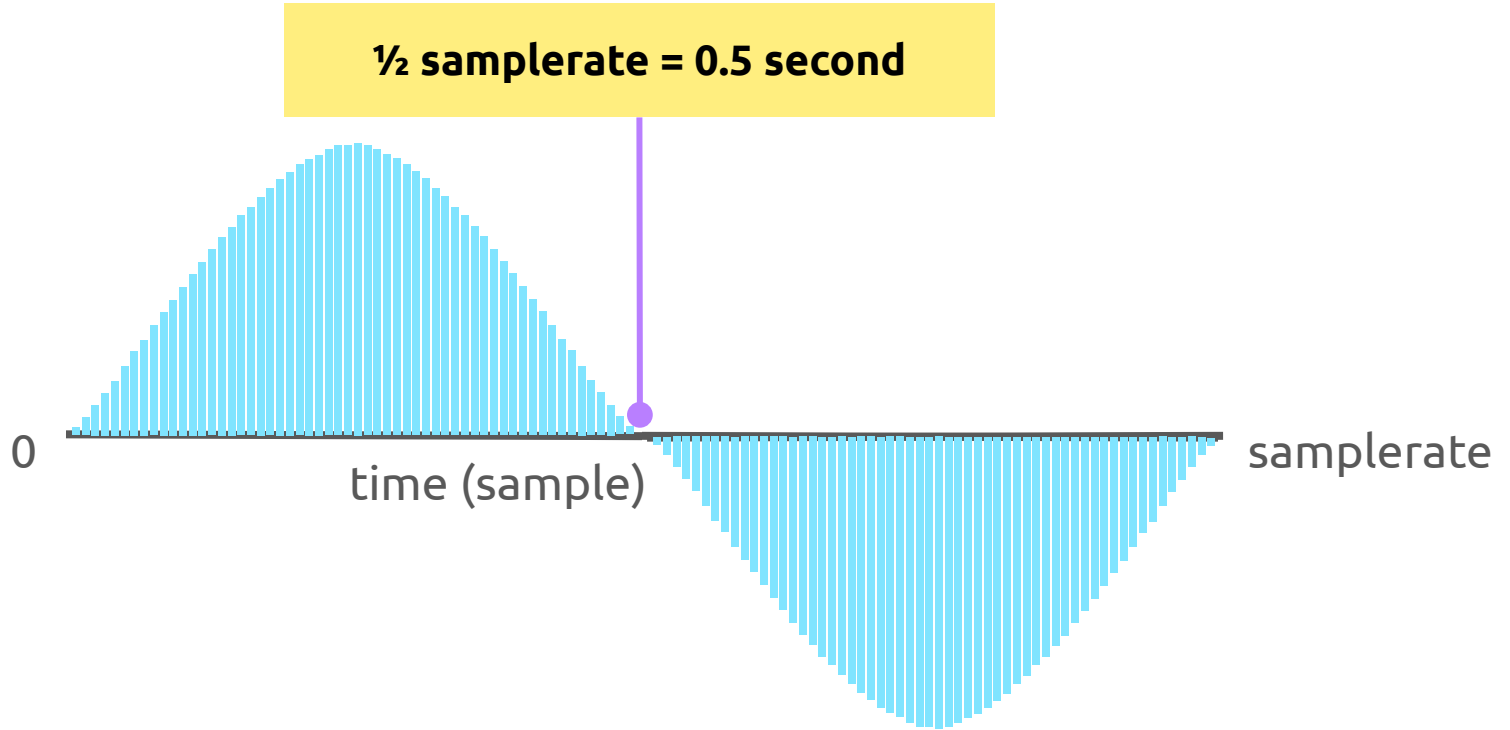
Continuous time → discrete time

interval $[0, 1]$ (second) → interval $[0, \text{samplerate}]$ (sample)



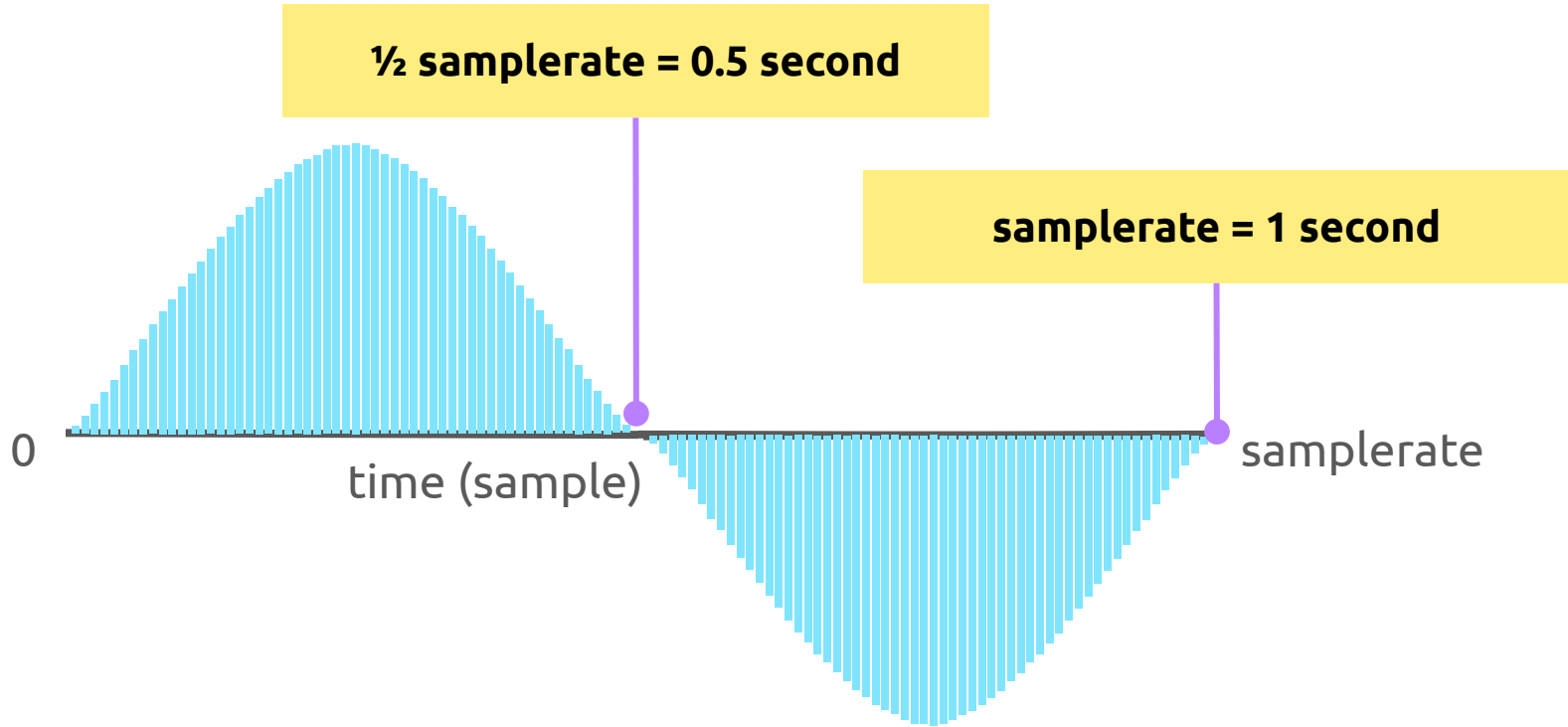
Continuous time → discrete time

interval $[0, 1]$ (second) → interval $[0, \text{samplerate}]$ (sample)



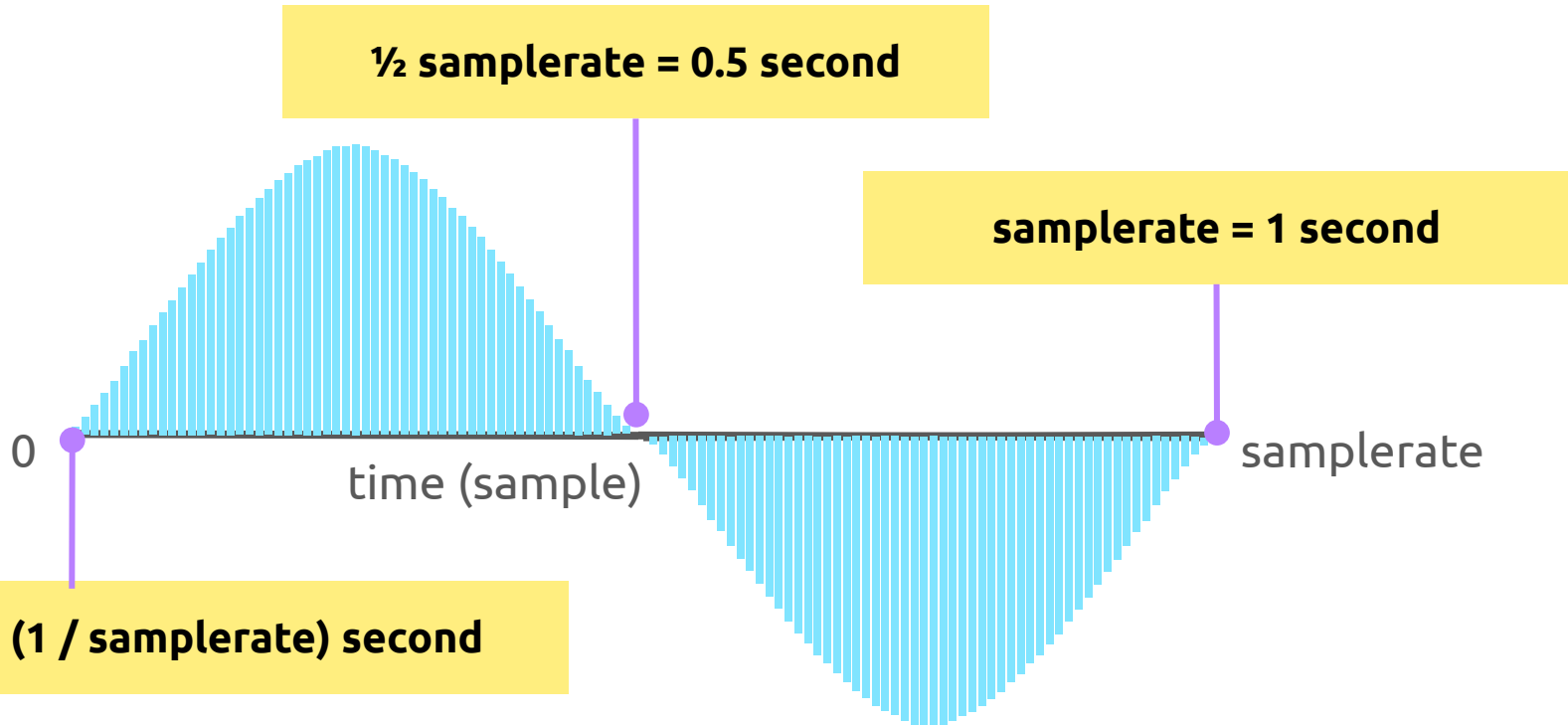
Continuous time \rightarrow discrete time

interval $[0, 1]$ (second) \rightarrow interval $[0, \text{samplerate}]$ (sample)



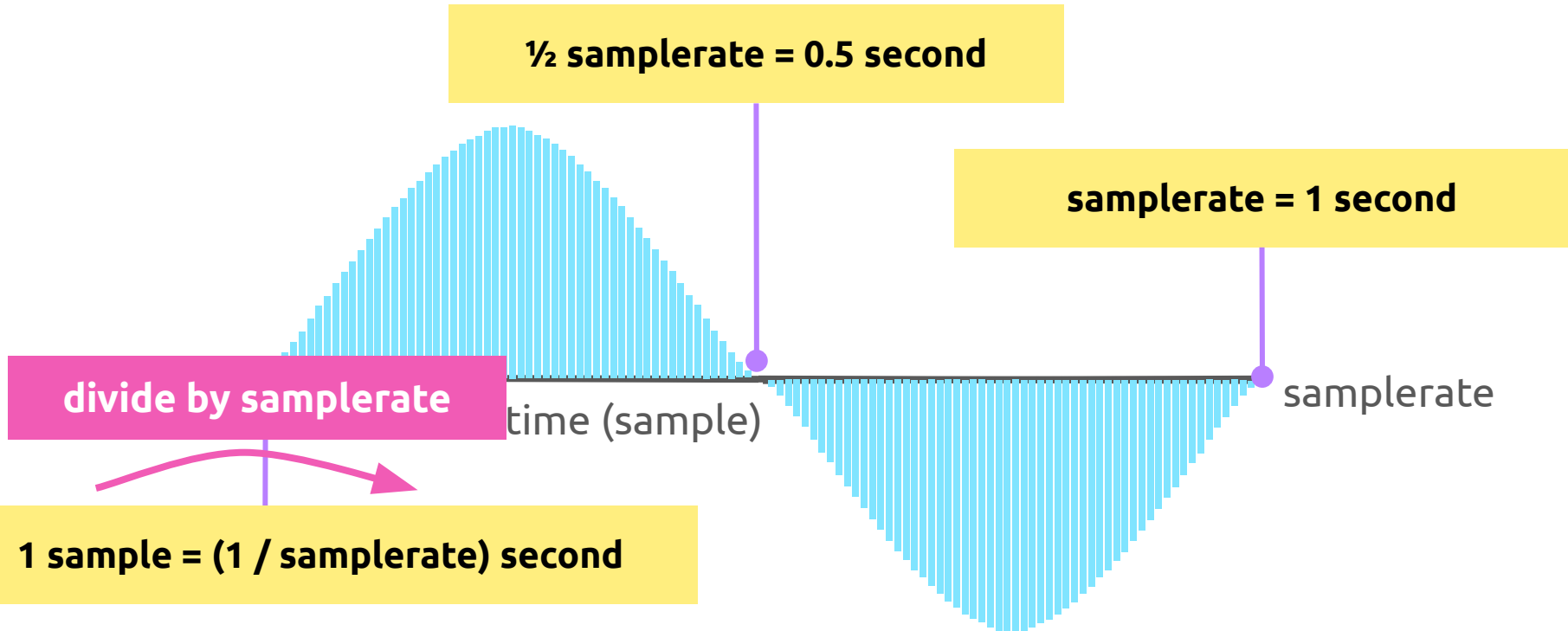
Continuous time → discrete time

interval $[0, 1]$ (second) → interval $[0, \text{samplerate}]$ (sample)



Continuous time → discrete time

interval $[0, 1]$ (second) → interval $[0, \text{samplerate}]$ (sample)

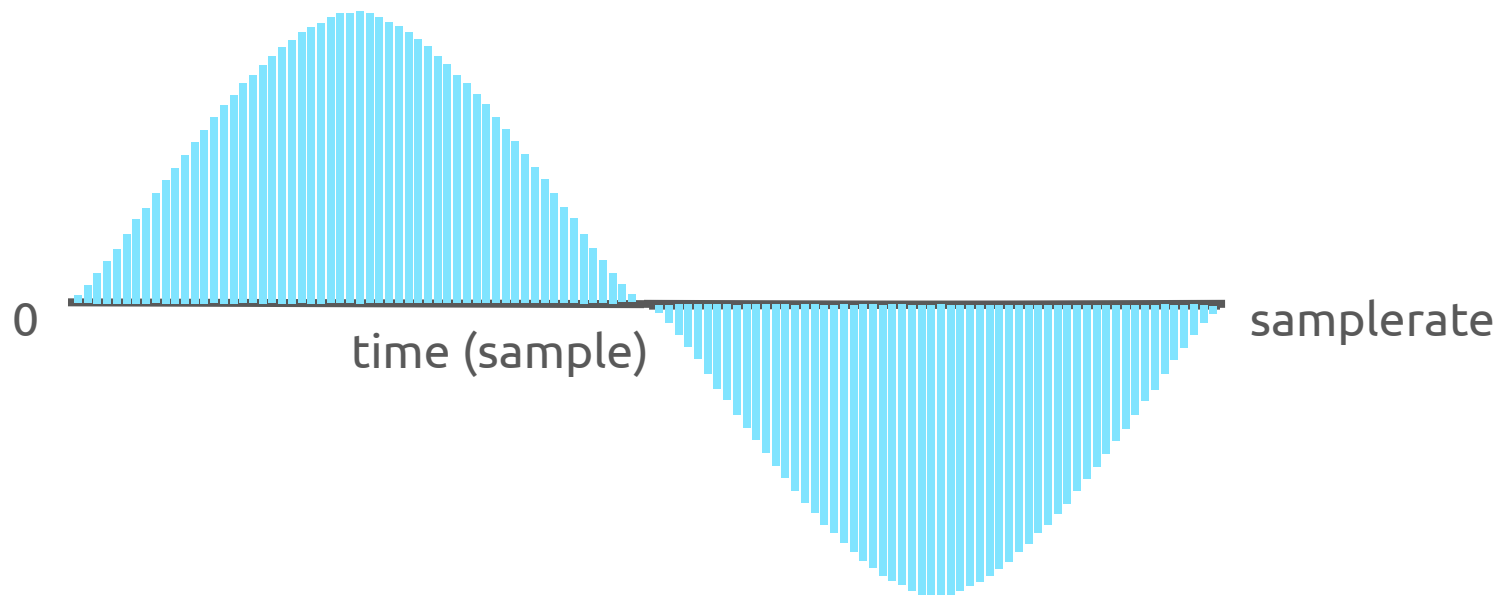


Sine

phase

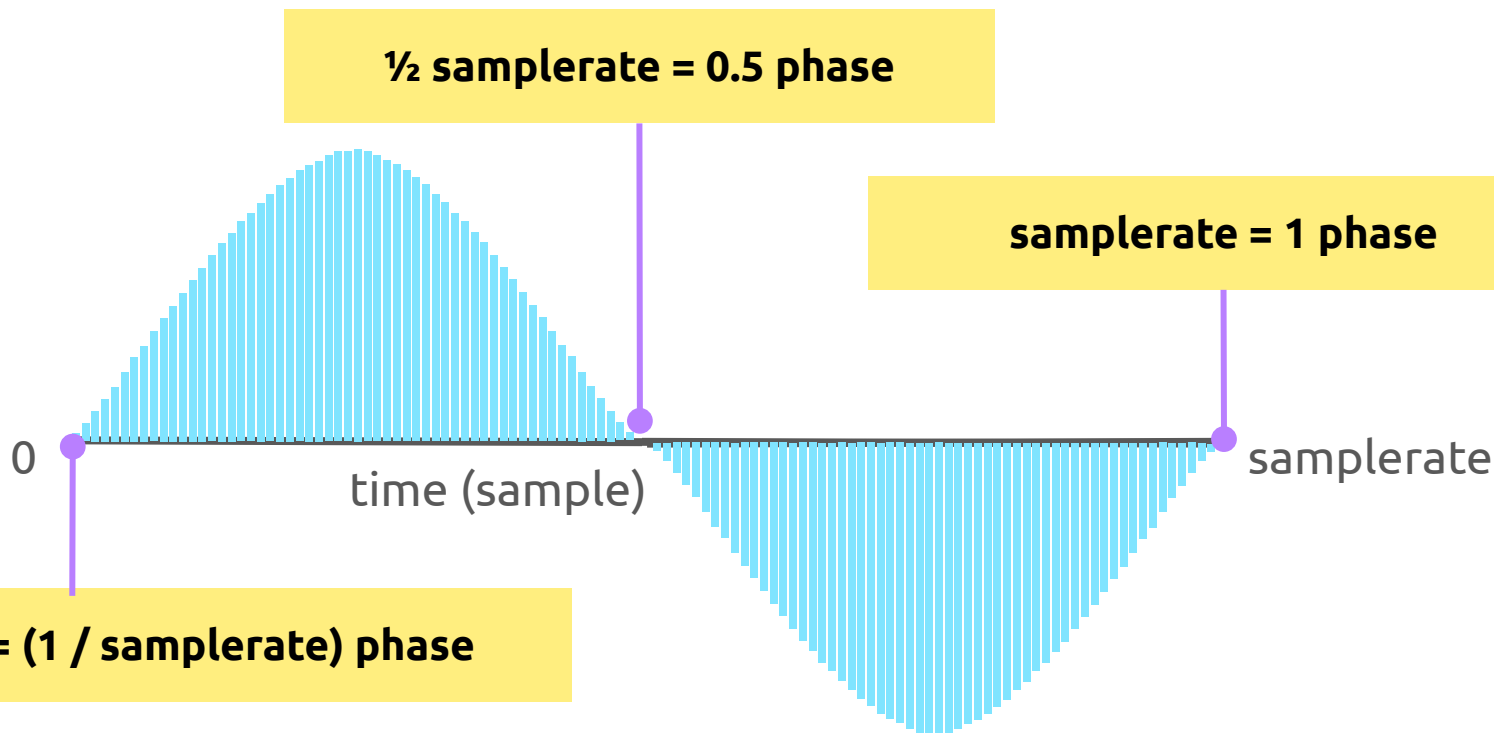
Sine in discrete time

$[0, \text{samplerate}]$ samples $\rightarrow [0, 1]$ phase



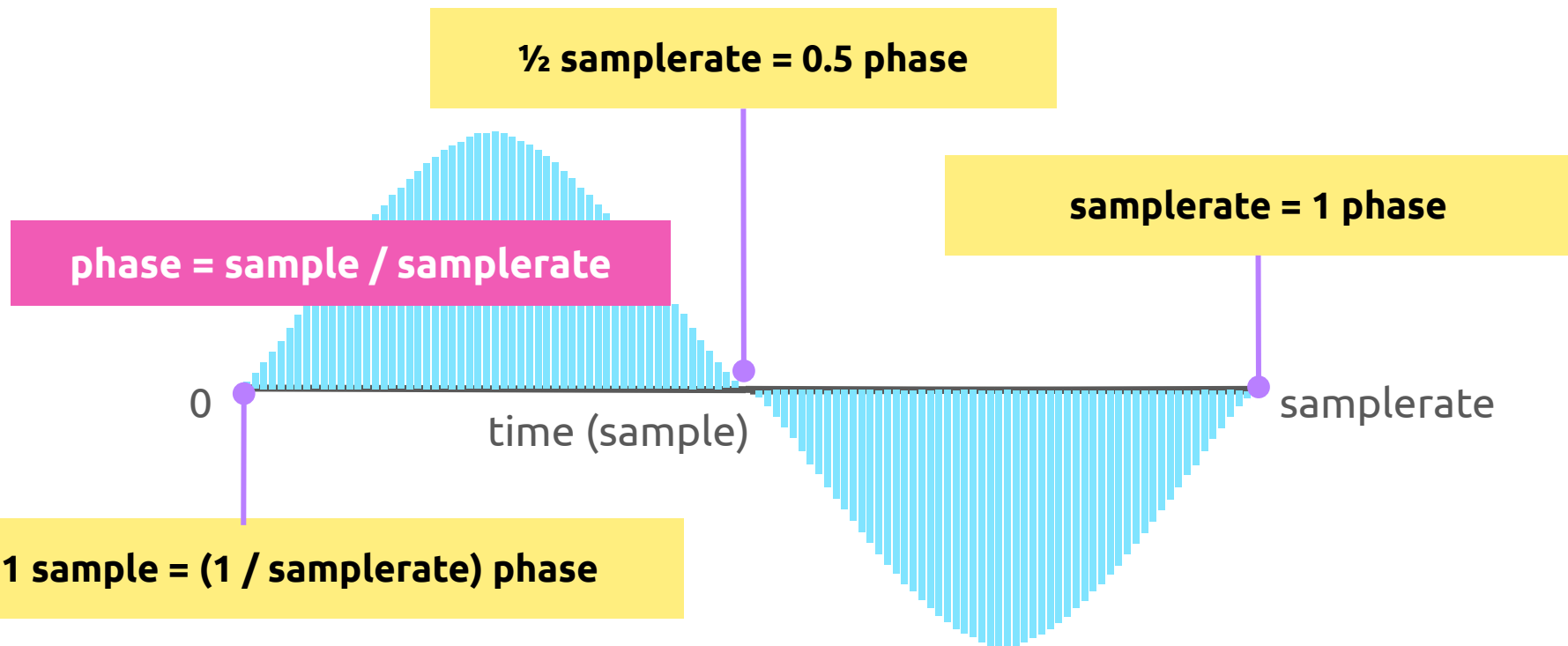
Sine in discrete time

$[0, \text{samplerate}]$ samples $\rightarrow [0, 1]$ phase



Sine in discrete time

$[0, \text{samplerate}]$ samples $\rightarrow [0, 1]$ phase



To sum up

- Continuous time

$$f(t) = \sin(t * 2\pi)$$

- Discrete time

$$f(\text{sample}) = \sin(\text{sample} / \text{samplerate} * 2\pi)$$

- Discrete time, expressed as function of the phase

$$f(\text{phase}) = \sin(\text{phase} * 2\pi)$$