

# DT Sinc Function (1B)

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- Discrete Time Sinc Function

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This document was produced by using OpenOffice and Octave.

# DT Sinc Function

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# DT Signal Aliasing - COS

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# CT Sinc Function (1)

## Normalized Sinc function

$$\mathit{sinc}(t) = \frac{\sin(\pi t)}{\pi t}$$

$$\mathit{sinc}(-t) = \sin \frac{(-\pi t)}{-\pi t} = \mathit{sinc}(t)$$

**an even function**

$$\lim_{t \rightarrow 0} \frac{\sin(\pi t)}{\pi t} = 1$$

**Maximum:**  $\mathit{sinc}(0) = 1$  when  $t = 0$

$$t = n \quad n: \text{integer} \quad (n \neq 0)$$

$$\mathbf{Zeros:} \quad \mathit{sinc}(t) = \frac{\sin(n\pi)}{n\pi} = 0$$

## Unnormalized Sinc function

$$\mathit{sinc}(x) = \frac{\sin(x)}{x}$$

$$\mathit{sinc}(-x) = \sin \frac{(-x)}{-x} = \mathit{sinc}(x)$$

**an even function**

$$\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$$

**Maximum:**  $\mathit{sinc}(0) = 1$  when  $x = 0$

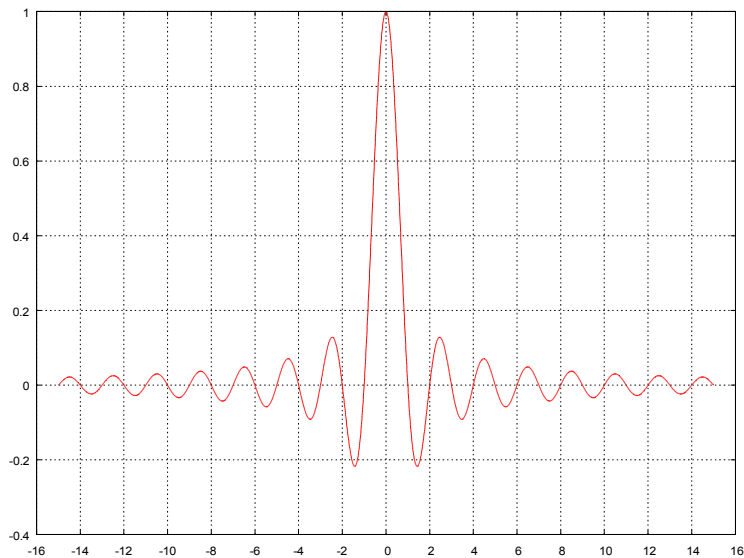
$$x = \pi n \quad n: \text{integer} \quad (n \neq 0)$$

$$\mathbf{Zeros:} \quad \mathit{sinc}(x) = \frac{\sin(x)}{x} = 0$$

# Sinc Function (2)

## Normalized Sinc function

$$\mathit{sinc}(t) = \frac{\sin(\pi t)}{\pi t}$$



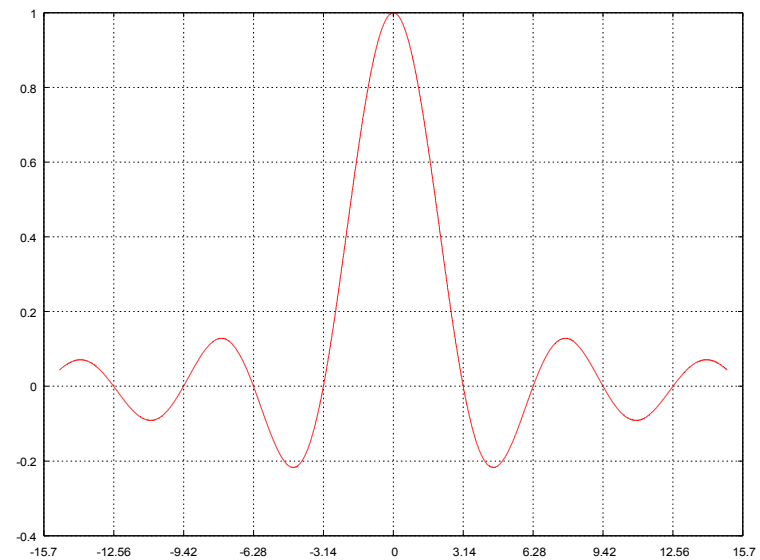
Zeros at  $t = n$   $n$ : integer ( $n \neq 0$ )

## Normalized Sinc function

Octave  $\mathit{sinc}(x) = \sin(\pi x)/(\pi x)$

## Unnormalized Sinc function

$$\mathit{sinc}(x) = \frac{\sin(x)}{x}$$



Zeros at  $x = \pi n$   $n$ : integer ( $n \neq 0$ )

## Unnormalized Sinc function

## References

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- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] G. Beale, [http://teal.gmu.edu/~gbeale/ece\\_220/fourier\\_series\\_02.html](http://teal.gmu.edu/~gbeale/ece_220/fourier_series_02.html)
- [4] C. Langton, <http://www.complextoreal.com/chapters/fft1.pdf>