

intro to mathematics in software engineering

Fontys University of Applied Sciences

April 14, 2025

objectives

scary looking functions

math related software engineering concepts

translate math to programming

fundamentals of mathematical and function notation

$$f(x) = x^2$$

fundamentals of mathematical and function notation

$$a \cdot f(x)$$

$$f(x/b)$$

$$f(x - c)$$

$$f(x) + d$$

fundamentals of mathematical and function notation

$a \cdot f(x) \Rightarrow$ multiplies the y-value by a

$f(x/b) \Rightarrow$ multiplies the x-value by b

$f(x - c) \Rightarrow$ shifts graph c units to the right

$f(x) + d \Rightarrow$ shifts graph d units upward

breaking down a scary looking function

$$g(x) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\sin(2\pi(2n-1)ft)}{2n-1}$$

(where t = time, f = frequency, n = iterations)

breaking down a scary looking function

$$g(x) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\sin(2\pi(2n-1)ft)}{2n-1}$$

we are dealing with a function built from multiple
smaller functions added together

breaking down a scary looking function

$$g(x) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\sin(2\pi(2n-1)ft)}{2n-1}$$

the *sin* on the inside suggests we are dealing with
waves or oscillations

breaking down a scary looking function

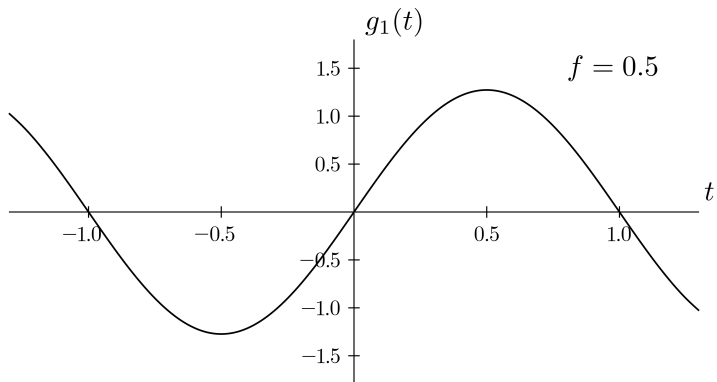
$$g(x) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\sin(2\pi(2n-1)ft)}{2n-1}$$

denominator $2n-1$ hints that terms get smaller as n increases - later terms have less influence

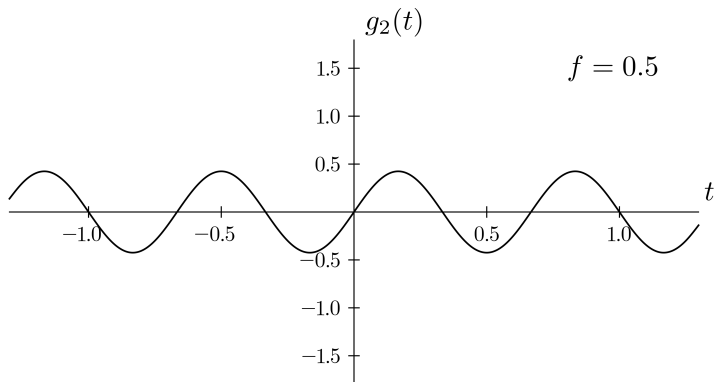
breaking down a scary looking function

$$\begin{aligned}g_1(t) &= \frac{4}{\pi} \cdot \frac{\sin(2\pi(2(1) - 1)ft)}{2(1) - 1} \\&= \frac{4}{\pi} \cdot \frac{\sin(2\pi(1)ft)}{1} \\&= \frac{4}{\pi} \cdot \sin(2\pi ft) \\g_1(t) &= \frac{4}{\pi} \sin(2\pi ft)\end{aligned}$$

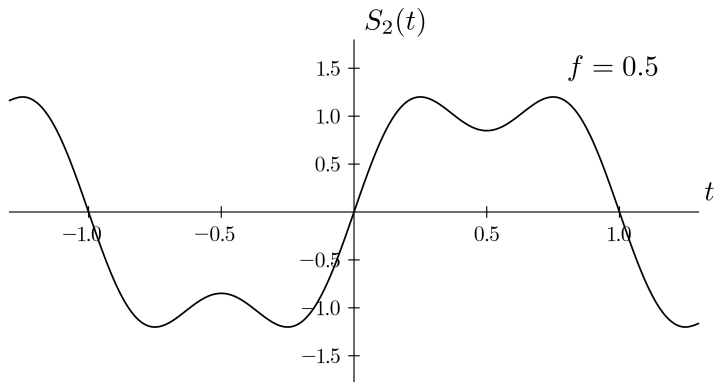
breaking down a scary looking function



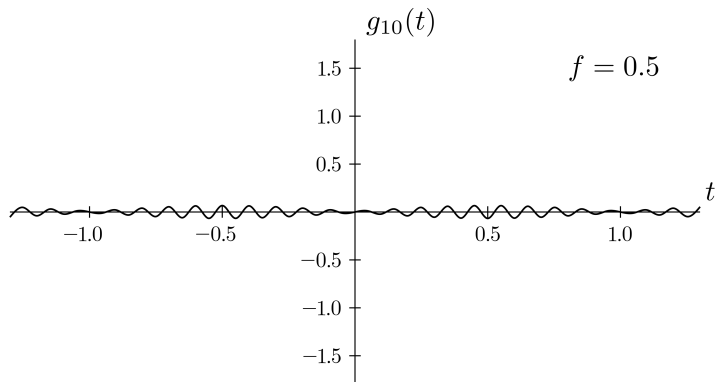
breaking down a scary looking function



breaking down a scary looking function



breaking down a scary looking function



breaking down a scary looking function

