Lecture 3

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Functions

Math

Combinatorics

- Function notation
- Counting for adults…

What is a function?

- Portable series of instructions.
- $f(x, y) = x + y \longrightarrow f \quad x \quad y = x + y$

Why do we use functions?

- Portable reusable logic
- Combinator patterns

Defining functions

- Name: bind the Logic to a callable name
- Type: the logic should have an output
- Parameters: function inputs (arguments)
- Logic: define function logic

"Simplicity is a great virtue but it requires hard work to achieve it and education to appreciate it. And to make matters worse: complexity sells better."

-Edsger W. Dijkstra

Build examples

- Sum function
- Summation function
- Euclidian distance function

Sum function

$$sum : \quad Number \to Number \to Number$$

$$sum(x, y) = x + y$$

Parameter list

Logic

Summation function

$$\sum : Collection \rightarrow Number$$

$$sum \leftarrow 0, \sum A = \forall x \in A, sum \leftarrow x + sum$$

Temp value

Iterative symbols

Logic

Euclidian distance

$$\alpha = (x, y)$$

$$\Delta : \alpha \to \alpha \to Number$$

$$\Delta p_0 p_1 = c, \text{ where}$$

$$a \leftarrow |x_1 - x_2|$$

$$b \leftarrow |y_1 - y_0|$$

$$c \leftarrow \sqrt{a_2 + b_2}$$

"Computer Science is no more about computers than astronomy is about telescopes"

-Edsger W. Dijkstra