

Discrete Mathematics for Computer Science

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What is Discrete Mathematics?

Definition (Discrete mathematics)

Discrete mathematics: study of countable, distinct, or separate mathematical structures.

Example (Pixel)

Phones, computer monitors, televisions, modern screens, & Disney cartoons, animated films for kids & for adults, e.g., Rick & Morty.

Some Critical Thinking Questions

Some purpose-driven questions:

- *Why do undergraduate or graduate students need to learn mathematics?*
- *Which type of mathematics do undergraduate or graduate students need to learn?*
- *Why do CS-major students need to study Discrete Mathematics?*

Motivations

Combinatorics using SciPy

Problem (Permutation, arrangement, combination)

Given $n, k \in \mathbb{N}^$, $k \leq n$. Use Pascal/Python/C/C++ to compute the numbers of permutations P_n , of arrangements A_n^k , of combinations C_n^k .*

Solution.

$P_n = n!$, $A_n^k = \frac{n!}{(n-k)!}$, $C_n^k = \frac{n!}{k!(n-k)!}$. Run `combinatorics.py`. \square

Problem (Pascal triangle)

Given $n \in \mathbb{N}^$. Use Pascal/Python/C/C++ to print the 1st $n + 1$ lines of the Pascal triangle.*

References

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- WR21 RYAN T. WHITE, ARCHANA TIKAYAT RAY. *Practical Discrete Mathematics: Discover math principles that fuel algorithms for computer science & machine learning with Python*.