Discrete Mathematics

University Computer Science · Vocabulary in context

Word	Example
discrete mathematics	**Discrete mathematics** studies whole things you can count, such as logic and graphs.
truth table /truːθ ˈteɪbl/	A **truth table** shows the output for every input.
predicate logic	**Predicate logic** adds “for all” and “there exists” to simple logic. “for all” “there exists”。
direct proof	A **direct proof** derives the conclusion from the assumptions.
contraposition	In proof by **contraposition**, you show “not Q” leads to “not P”. “not Q” “not P”
contradiction /ˌkɒntrəˈdɪkʃn/	Proof by **contradiction** starts by assuming the claim is false.
power set	The **power set** of {a, b} is {∅, {a}, {b}, {a, b}}. {a, b} {∅, {a}, {b}, {a, b}}
injective /ɪnˈdʒektɪv/	An **injective** function never sends two inputs to the same output.
surjective /sɜːˈdʒektɪv/	A **surjective** function reaches every value in its target set.
bijective	A **bijective** function pairs every input with exactly one output, with none left over.
equivalence relation /ɪˈkwɪvələns rɪˈleɪʃn/	“Has the same birthday as” is an **equivalence relation**. “Has the same birthday as”

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base case /beɪs keɪs/	For this sequence, prove $n = 1$ as the **base case**. $n = 1$
inductive step /ɪn'dʌktɪv step/	The **inductive step** proves the next case from the current case.
induction hypothesis	The **induction hypothesis** assumes the claim holds for $n = k$. $n = k$
addition rule /ə'dɪʃn ruːl/	Use the **addition rule** to count choices from disjoint groups.
multiplication rule /ˌmʌltɪplɪ'keɪʃn ruːl/	By the **multiplication rule**, three shirts and two hats give six outfits.
permutation /ˌpɜːmjuː'teɪʃn/	In a **permutation**, changing the order changes the arrangement.
combination /ˌkɒmbɪ'neɪʃn/	In a **combination**, the order of chosen items does not matter.
inclusion–exclusion	**Inclusion–exclusion** adds two groups, then takes away the people counted twice.
handshake lemma	The **handshake lemma** says the degrees of all nodes add up to twice the number of edges.
adjacency matrix	An **adjacency matrix** is a table of 0s and 1s showing which nodes are joined. 0 1
adjacency list /ə'dʒeɪsənsi lɪst/	An **adjacency list** stores each node with a list of its neighbours.
tree /triː/	An undirected **tree** is connected and has no cycles.

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BFS	**BFS** visits all close nodes first, then nodes further away.
DFS	**DFS** goes as deep as possible along one path before going back.
sample space /ˈsæmpl speɪs/	The **sample space** is the list of all possible outcomes.
conditional probability /kənˈdɪʃənl ˌprɒbəˈbɪlɪti/	Find the **conditional probability** using only the chosen group.
Bayes' theorem	Use **Bayes' theorem** to update a probability after observing evidence.

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