Discrete Mathematics

Class: MATH 2410

Naive Set Theory

Set Notation

Cartesian Product	$A \times B = \{(x, y) \| x \in A \wedge y \in B\}$

Functions

Functions	A rule that assigns each input exactly one output.
Range	The set of all elements which are assigned to at least one element of the domain by the function.
Domain	The set of all input of a function.
Codomain	The set of all allowable output a function.
$f : x \leftarrow y$	a function f with a domain x and a codomain y.
Recursive f.	
Injectiuve	every element of the codomain is the image of **at most** one element from the domain.
Surjective	every element of the codomain is the image of **at least** one element from the domain.
Bijection	A function that is **Injective** and **Surjective**.
Image	$f(A) = \{f(a) \in Y : a \in A\}$, where $A \subset$ domain.
Inverse Image	$f^{-1}(B) = \{f(b) \in X : b \in B\}$, where $B \subset$ codomain.

Counting

Additive Principle

General Definition: if event A can occur in m ways, and even B can occur in n **disjoint** (A and B can't apen at the same time.) ways, then A and B can occur in $m + n$ ways.
Set Definition: Given 2 sets A and B, if $A \cap B = \emptyset$, then $|A \cap B| = |A| + |B|$.

Multiplicative Principle

General Definition: if event A can occur m ways, and each possibility for A allows for exactly n ways for event B, then the event "A and B" can occur $m \cdot n$ ways.
Set Definition: Given 2 sets A and B, we have $|A \times B| = |A| \cdot |B|$.

Sequences

Symbolic Logic

Proofs

Graph Theory