6: Sets & Counting

1/22/16

Deft: A set on is an unordered collection of objects, referred to as elements or members of the set.

Eg: S= {1, 2, 3, 43

the elements of S are 1, 2, 3, and 4.

t.g: S= {cow, dog, horse }.

Rmk: Sets do not capture repitition. The sets S= {1, 2, 3,4} and T= {1, 2, 2, 3, 4} are the same.

Def: A set S is a subset of the set Tif every element of Sis also an element of T. Venn Diagram; (35) A subset Sof T is said to be a proper subset of T if S and T are not the Same. Eg: $S = \{1, 7, 3\}$, $T = \{1, 7, 3, 4, 5, 6\}$ ©

We denote "S is a subset of T" by $S \subseteq T$ (think \leq)

We denote "S is a proper subset of T"

by $S \subset T$. (think \leq)

Rmk: We say two sets S and T are equal if SET and TES; we write if and only if S=T.

Notation: If x is an element of \$5
we write x eS to denote this
relationship. Formally read "x is an element of
S," commonly read "x is in S."

Deft: If a set S has finitely many elements (i.e. you can could write down all of them), we say S is a finite set.

If S is not finite, we say S is infinite.

Common Infinite Sets IN = { all positive integers} = "natural numbers" A = { all posture integers } Q = {all rational numbers } R= {all real numbers } C= { all complex numbers }. condition "Set Builder Notation" Eall even, positive integers = {XEIN | 2 divides x} "such that " C= {xtiy | XER, yers, i= 5-1 Q={\$\frac{1}{2}} \ XEA, yEAS Efirst 5 million positive integers = [x EIN] x = 500000] Deft: The cardinality of a set S, denoted 15/ Chyme) or n(S) (by the book) or # S (by others), is the number of elements in Sif Sis finite, infinity otherwise.

Eg: S= {cow, dog, moose}

|S|= 8.3.

| N = 00

IR/= 00

Set Operations

Deft The set with no elements is the empty set, &.

Let A and B be sets.

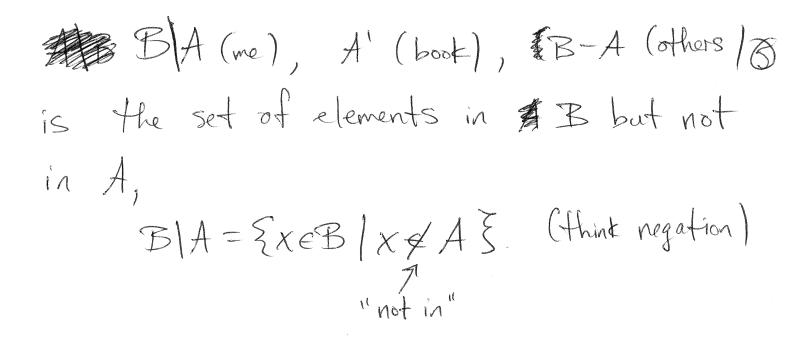
The union of A and B, written AUB, is the set of elements either in A or in B. (or \$ in both)

AUB= {x | x ∈ A or x ∈ B}. (think disjunction)

12) The intersection of A and B, written AnB, is the set of common elements

AnB = {x | xeA and xeB} (think conjunction/and)

3 If A = B, the complement of A in B, written



Eg: NCZCQ.

ZIN = { negative integers} v {o} QIN = { negative integers} v {a|b|b+1, a = #5