I. SET THEORY

A. DEFINITION & NOTATION

- SET IS AN UNORDERED COLLECTION OF ELEMENTS
- P := SET
- p := ELEMENTS

B. BASIC RELATIONSHIPS

LET A, B, C BE SETS & X, Y, Z BE ELEMENTS

$A = \{x, y\}$ $B = \{y, z\}$ $C = \{x, y, z\}$

MEMBER $x \in A$

NOT $x \notin B$

SUBSET $B \subset C : \forall\ w \in B,\ w \in C$

$w \in B \Rightarrow w \in C$

INTERSECTION : $A \cap B$: $w \in A \cap B \overset{IFF}{\Longleftrightarrow} w \in A$ A OF B

UNION : $A \cup B$: $w \in A \cup B \Leftrightarrow w \in A$ OR $w \in B$

1. BASIC RELATIONSHIPS

UNIVERSAL SET S

NULLSET ϕ

EX: NON-NEG $\mathbb{Z} < 4$

$S = \{0, 1, 2, 3\}$

$S \subset S$ & $\phi \subset S$

SUBSETS OF S

$A = \{0, 2\}$ $D = \{0, 1\}$

$B = \{1, 3\}$ $E = \{0\}$

$C = \{1, 2, 3\}$ $F = \{2\}$

COMPLEMENT : A^c $\forall$ IN S THAT IS NOT IN A

$x \in S$ & $x \notin A \Leftrightarrow x \in A^c$

$A^c = B$

LECTURE 1 PROB. BASICS

SETS - MUTUALLY EXCLUSIVE

DISJOINTED SETS

PAIRWISE M.E.

PARTITION : COLLECTION OF SETS, ME & EX.

ANY SET AND ITS COMPLEMENT IS ALWAY PARTITIONS OF EACHOTHER

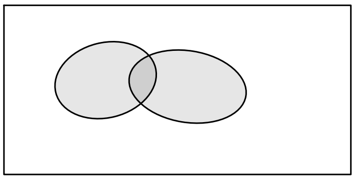
COUNTABLY INFINITE : $\mathbb{Z}$

UNCOUNTABLY INFINITE : $[0, 1]$

VENN DIAGRAM : VISUAL REPRESENTATION

S : INTERIOR OF LARGE BOX

SUBSET : INTERIORS OF BOXES, OVALS, ETC.



RELATIONSHIP TO BOOLEAN ALGEBRA

$\cap$ - AND, OR - $\cup$, NOT - S^c

DEMORGANS LAW

$(B \cup D)^c = B^c \cap D^c$

PF OUTLINE $(B \cup D)^c \subset (B^c \cap D^c)$

$x \in (B \cup D)^c \Leftarrow\Rightarrow ?\ x \in (B^c \cap D^c)$