8/27 ☆) H.W #0

All math based on it:

Stat — Lec 20-23

Prob — Lec 2-20

Set theory — Lec 1/2

↳ 1870's by 20th century

Define as sign as (Cassignal def) Denemas

$F := \{\text{Jane}, \text{Mary}, \text{Susan}, \text{Dane}\}$

↑ separate

$M = \{\text{Bob}, \text{Joe}, \text{Max}, \text{Damn}\}$

$\mathbb{N} = \{1, 2, 3, \ldots\}$ infinite number

integers

$\mathbb{Z} = \{\ldots, -1, 0, 1, \ldots\}$

Jane $\in F$ — $\in$ = set inclusion "element of"

Jane $\notin M$ — $\notin$ = not

$\{\text{Jane} \ldots\} = F$ — "$=$" = equality

$\{\text{Joe} \ldots\} \neq F$ — "$\neq$" = inequality

$\{\text{Jane}, \text{Mary}\} \subseteq F$ — $\subseteq$ = all elements in set subset

$\{\text{Jane}, \text{Mary}\} \subset F$ — $\subset$ = proper subset same def but not equal "shagleren"

$\{Jane\} \subset F$

credicaids

$\in, \notin, =, \neq, \subseteq, \subset$

$f(A,B)$

range $\{T, F\}$

Union

$F \cup M$

Combine both sets elements

$\{Jane\} \cup \{Jane\} = \{Jane\}$

non-exclusive or

$\mathbb{N}_0 := \mathbb{N} \cup \{0\}$

Intersection

$F \cap M =$ only elements in both

"and"

$F \cap M = \{Dana\}$

No set

empty set

$\emptyset = \{\}$

odd #s $\cap$ Even #s

$= \{\}$

$F \cap \{Bad\} = \emptyset$

Def. sets A, B are exclusive
if $A \cap B = \emptyset$

$\emptyset \subset F$ $\quad$ $\emptyset \subseteq F$ $\quad$ $\emptyset \notin F$

Difference / strategy
$F \setminus M = \{$ Jane, Mary, Susan $\}$
all elements in F not in M

$A \cap B = \emptyset$
$A \setminus B = A$
$B \setminus A = B$

$A = B \Rightarrow A \cap B = A \cup B$

$A \subseteq B$
$= A \setminus B = \emptyset$

$\{ 2n : n \in \mathbb{Z} \} = \{ \cdots -2, 0, 2 \cdots \} = E$

all element $2 \cdot n$ such that n is $\mathbb{Z}$

$A = \{1, 2, 3\}$ $\quad 2^A = \{ B : B \subseteq A \} = \{ \{1,2,3\}, A, \emptyset, \{2,3\}, \{1,3\}, \{1\}, \{2\}, \{3\} \}$

powered set

$\{3, 2\} \in 2^A$

size AKA cardinality.

$|A| = 3$ $\qquad |\,|: \text{set} \to \mathbb{N}_0$

pipe operation

$|F \cup M| = 7 \quad |F| + |B|$

$|F \cap M| = 1$

$|F \setminus M| = 3$

$|2^F| = 16$

"counting in a heritic"

$|S| < \infty,$

$|2^S| = 2^{|S|}$

special set Ω = "Universe", "Sample space", "Space of discourse" "scope"

$\Omega = F \cup M$

$F \subseteq \Omega$

$2^F \subseteq \Omega$ [False]

Coin flip $\Omega = \{H, T\}$

$\Omega = \{1, 2, 3, 4, 5, 6\}$

what is the probability that a random name is female?

Assume $\Omega = F \cup M$

$$P(F) = \frac{|P|}{|\Omega|}$$

random - which all are equal likely

Working definition

$$P(A) = \frac{|A|}{|\Omega|} \text{ forall } A$$