

STAT 230 F2017

MY UNOFFICIAL
REVIEW NOTES

CH4

Allog

CHAPTER 4

PROBABILITY TECHNIQUES BY
MAPPING INTERSECTION + UNION TO
PROBABILITIES.

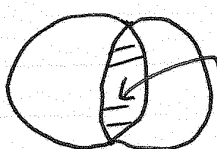
DE MORGAN ① $P(\overline{A \cup B}) = P(\overline{A}) \cap P(\overline{B})$

② $P(\overline{A \cap B}) = P(\overline{A}) \cup P(\overline{B})$

DO A VENN DIAGRAM, YOU CAN SEE THIS
VISUALLY

UNIONS:

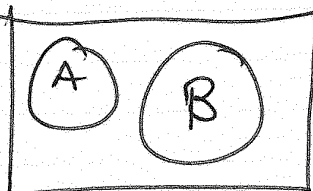
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$



$P(A \cap B)$ COUNTED TWICE.

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$

MUTUALLY EXCLUSIVE:



$$P(A \cap B) = 0$$

$$\text{SO } P(A \cup B) = P(A) + P(B)$$

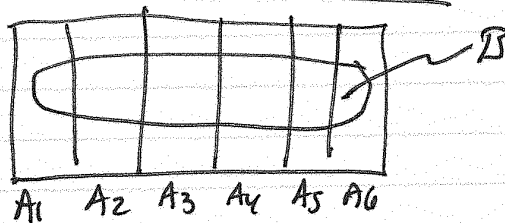
INTERSECTIONS $P(A \cap B)$
+ INDEPENDENCE

IF INDEPENDENT, $P(A \cap B) = P(A)P(B)$

CONDITIONAL PROBABILITY

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

LAW OF TOTAL PROBABILITY



IF A_i 'S ARE MUTUALLY EXCLUSIVE THEN

$$P(B) = \sum P(B|A_i) P(A_i)$$

USEFUL STUFF: MEMORIZE!

THIS IS ONLY A SUMMARY, NOT ALL OF THEM.

GEOMETRIC: $\sum_{x=0}^N a^x = \frac{1-a^{N+1}}{1-a}$ FOR $a \neq 1$

FOR PROBABILITIES, a WILL BE $0 \leq a < 1$ SO USE THIS ONE $\rightarrow 1 - a^{N+1}$ FOR $|a| < 1$

BINOMIAL $\sum_{x=0}^N \binom{N}{x} a^x = (1+a)^N$ FOR $|a| < 1$

MULTINOMIAL: $\sum \frac{N!}{x_1! x_2! x_3!} a^{x_1} b^{x_2} c^{x_3} = (a+b+c)^N$

HYPERGEOMETRIC $\sum \binom{a}{x} \binom{b}{N-x} = \binom{a+b}{N}$

EXPONENTIAL $\sum \frac{a^N}{N!} = e^a$