

L26: March ~~28~~ 29, 2017.

Housekeeping: EXAM 2 IS ON FRIDAY.

- A15 due in class today
- Week 7 { discussion summary due Monday on Canvas
- Final Essay for Book project

Last time: Bayes' Theorem

Today: Review for Exam 2.

- Exam 2 :
- No calculators or phones, etc.
 - 9-10 problems (may have sub-parts)
 - One sheet of 8.5" x 11" paper, handwritten (by you) notes allowed on both sides
 - likelihood of bonus...

TOPICS

- Basics of probability: experiment, outcomes, sample space, event, probability
 - "Common" experiments: dice rolling; coin flipping; card choosing, etc.
 - (QUIZ 4) • HW 9 • Cartoon guide, week 6
 - Counting
 - Generalized rule of counting - QUIZ 4
 - Permutations: $nPr = \frac{n!}{(n-r)!}$
 - Combinations: $nCr = \frac{n!}{(n-r)! r!}$
- } QUIZ 5
TRIOLA BOOK
(on Canvas)
- Homework 10, 11, 12

- "Compound events", e.g., given A and B, what is...

A and B not A A or B, but not both
 A or B A or not B - etc. -
 A not B \longleftrightarrow A and not B • W7 CG

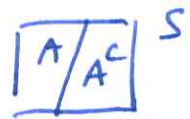
- Drawing Venn diagrams
- Writing sets of elem. outcomes explicitly
- Laws of probability

- Laws of prob. for compound events:

- $\underline{P(A \text{ or } B)} = \underline{P(A)} + \underline{P(B)} - \underline{P(A \text{ and } B)}$

- $P(A) + P(\text{not } A) = 1$

- Mutually exclusive events • W7 CG



- Conditional probability

- Interpreting cond'l prob. in words

- Reading cond'l prob. from tables

- Def'n: $P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$ • W7 CG

- Independent events:

$$P(A|B) = P(A) \text{ and } P(B|A) = P(B) \quad \cdot \text{W7 CG}$$

$$\rightarrow P(A \text{ and } B) = P(A)P(B) \leftarrow$$

- Multiplication Rule

$$P(A \text{ and } B) = P(A|B)P(B)$$

$$P(A \text{ and } B) = P(B|A)P(A)$$

A jury consisting of 9 men & 3 women —
what's P (choosing 2 jurors at random &
having both be women)

- Bayes' Theorem

- Formula

- A15

- Tree diagrams

Tree Diagram Example.

$$P(D) = 0.05$$

$$P(T|D) = 0.95$$

$$\underline{\underline{P(T|D^c) = 0.05}}$$



	T	T ^c	tot.
D	47.5	2.5	50
D ^c	47.5	902.5	950
tot.	95	905	1,000

"positive predictive value"
(of the test)

$$P(D|T) = \frac{47.5}{95} = \frac{1}{2} = 50\%$$

① 26 flavors on the menu



4 scoops (all different) → either ~~comb.~~ or perm.
order matters.

$$26 P_4 = \frac{26!}{(26-4)!} = \frac{26 \cdot 25 \cdot 24 \cdot 23 \cdot \cancel{22} \cdot \cancel{21} \cdots \cancel{2} \cdot \cancel{1}}{\cancel{22} \cdot \cancel{21} \cdot \cancel{20} \cdots \cancel{2} \cdot \cancel{1}} = 26 \cdot 25 \cdot 24 \cdot 23$$

② 26 flavors

4 scoops

order doesn't matter

$$26 C_4 = \frac{26!}{(26-4)! 4!} = \frac{26 \cdot 25 \cdot \cancel{24} \cdot \cancel{23} \cdots \cancel{2} \cdot \cancel{1}}{\underbrace{4 \cdot 3 \cdot 2 \cdot 1}_{= 24}} = 26 \cdot 25 \cdot 23 \cdot \cancel{22}$$

③

$$\frac{1}{26 \cdot 25 \cdot 23}$$

④

$$\frac{8!}{2! 2! 1! 1! 1! 1! 1! 1!}$$