STT 200 SEC. 13-16 1-11-10 CH 14 (PART OF 15)

Note Title 1/11/2010

INTRODUCTION TO PROBABILITY (PART OF CH 14→17 LEADING TO EXAM)

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REC. 1-12-10 DUE AT END OF RECITATION TOMORROW.

WHAT IS STATISTICS -

eg. NEWSPAPER "POLL REPORTS EST'D % OF VOTERS VOTING REPUB IS 61%. W/ MARGIN OF ERROR ± 1.3%"

IF EVERY ONE OF THE ASSUMPTIONS BEHIND THE METHOD IS CORRECT

Sample FRACTION ± MARGIN OF ERROR

eg
For our data

61 ± 1.3 (% SCALE)

$61 - 1.3$ to $61 + 1.3$

THIS HIT OR MISSED
p = % REP IN POPULATION

CH. 14. CLASSICAL PROBABILITY MODEL.

~~EQUALLY LIKELY~~ "OUTCOMES" RED DIE w/ GREEN DIE

R \ G	1	2	3	4	5	6
1				o		
2			o			
3	✓	✓	✓	✓	✓	✓
4	o					
5						
6						

36 POSSIBLE "OUTCOMES"

$P(R \leq 3) = \#\text{ FAVORABLE} / \#\text{ TOTAL} = \frac{6}{36} = \frac{1}{6}$

$P(R+G=5) = 4/36$

$P(R+G \neq 5) = 1 - 4/36 = \frac{32}{36}$

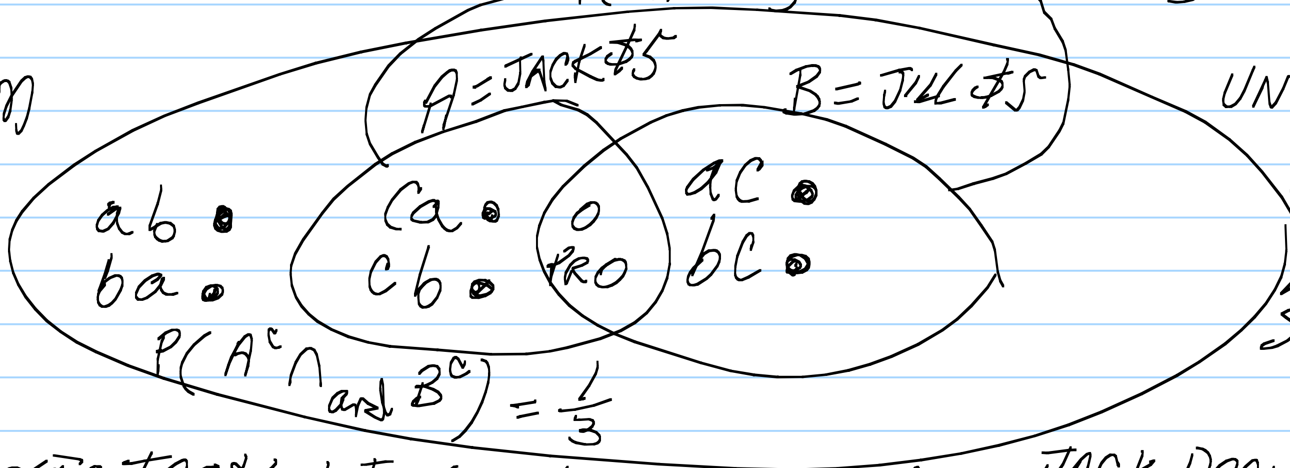
$(R+G=5)^C$ is $(R+G \neq 5)$

$P(R > G) = 15/36.$

EVENTS ARE SUBSETS OF OUTCOMES.

VENN DIAGRAM

$P(A) = \frac{1}{3}$ $P(B) = \frac{1}{3}$



UNIVERSE OF POSSIBLE OUTCOMES "SAMPLE SPACE"

EXAMPLE: JACK + JILL #1 #1 #5
a b c

JACK	JILL
a	b
a	c ✓
b	a
b	c ✓
c	a
c	b

2/6

$P(\text{JILL } 5) = 2/6 = \frac{1}{3}$

SAME AS JACK.

JACK DRAWS FIRST (EQ PR)
JILL DRAWS SECOND FROM THE TWO LEFT BY JACK.

? $P(\text{JACK } 5) = \frac{1}{3}$

CH. 15 ? $P(\text{JILL } 5) =$

$P(\text{JILL } 5) = P(\text{JACK } \$1 \text{ and JILL } \$5)$

$P(\text{JACK } 1) = 2/3$ $P(\text{JILL } 5 \mid_{\text{IF}} \text{JACK } 1) = \frac{1}{2}$

TABLE

GENE TYPE	LEFT	RIGHT	
AA	60	40	100
Aa	30	20	50
aa	15	40	55
	105	100	205

MARGINAL

MARGINAL TOTALS:

	L	R	
AA	60/205	40/205	100/205
Aa			
aa			

SO P(GET AA L) = ~~100~~/205 CORRECTION 60 !

RANDOMLY SEL'D PERSON

INDEPENDENT EVENTS?

EVENTS A, B ARE INDEPENDENT IF PR FOR B IS NOT CHANGED UPON LEARNING WHETHER OR NOT A HAPPENED.

	CANCER	NOT	
SMOKER	2000	100,000	102000
NOT	200	10,000	
	2200		110000

IN SMOKERS 2000/102000 GET C.

NON SMOKERS: 200/10200

DEF^{n} A, B ARE STATISTICALLY INDEPENDENT

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

eg TABLE ABOVE $P(S \,\&\, C) = \dfrac{2000}{110000}$

$P(S) = \dfrac{102000}{110000}$ $P(C) = \dfrac{2200}{110,000}$

MULT TO GET

CLASSICAL

$P(A \cap B) = \#A\cap B / \#TOT$

$= \dfrac{\#A}{\#TOT} \dfrac{\# A\cap B}{\# A}$

$= P(A)\,P(B|A)$ IF

GOES AWAY IF INDEP