

FIRST EX

DATE: IN CLASS SAS

1) a) PERMUTATION OF 30 STUDENTS ${}_{30}P_{30} = 30!$

b) $P(X) = \frac{\text{no. ways to succeed}}{\text{total no. poss. outcomes}} = \frac{1}{30}$ $P(X') = 1 - P(X) = \frac{29}{30}$

c) $P(Y) = \frac{1}{30}$ AS WELL

d) BY M.E., $P(X \cup Y) = P(X) + P(Y) = \frac{2}{30}$ $\therefore P(X \cap Y) = 0$
SINCE $X \cap Y = \emptyset$

2) a) $\begin{matrix} 1, 2 \\ 1, 3 \\ 1, 4 \\ 1, 5 \end{matrix} \quad \begin{matrix} 2, 3 \\ 2, 4 \\ 2, 5 \end{matrix} \quad \begin{matrix} 3, 4 \\ 3, 5 \end{matrix} \quad 4, 5 = 5$

b) SUM OF TWO NOS. $\begin{matrix} 3 \\ 4 \\ 5 \\ 6 \end{matrix} \quad \begin{matrix} 5 \\ 6 \\ 7 \\ 8 \end{matrix} \quad \begin{matrix} 7 \\ 8 \\ 9 \end{matrix}$ $A = \text{ODD}$ $B = \text{EVEN} = A'$
 $P(A) = \frac{5}{10}$ ODD!
 $P(B) = \frac{4}{10}$

3) COMMITTEE \rightarrow UNORDERED SUBSET

CHOOSE 4 FROM 300 ${}_{300}C_4 = \frac{300!}{4!296!} = \frac{300 \cdot 299 \cdot 298 \cdot 297}{4 \cdot 3 \cdot 2 \cdot 1} = 330,191,175$

4) BALL 1 \rightarrow 365 CHOICES FOR BIN
" 2 \rightarrow 364 " " " $365 \cdot 364 \cdot \dots \cdot 326 =$
" 40 \rightarrow 326 " " " $P = \frac{365!}{365-40!} = 3.37 \times 10^{101}$

5) NO. 5 CARD POKER HANDS $= \frac{52!}{52-5!} = \frac{52!}{5!47!}$

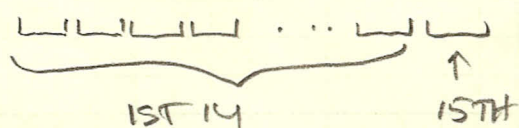
HANDS W/ AT LEAST 4 \diamond = HANDS W/ EXACTLY 4 + HANDS W/ EXACTLY 5

4 \diamond : $\begin{matrix} ({}_{13}C_4)({}_{39}C_1) \\ \uparrow \quad \uparrow \\ \text{choose 4} \quad \text{choose 1} \\ \text{13 DIAMONDS} \quad \text{39 NON-D} \end{matrix}$

5 \diamond : ${}_{13}C_5$

$P(\text{AT LEAST } 4) = P(\text{EXACTLY } 4) + P(\text{EXACTLY } 5)$
 $= \frac{({}_{39}C_4 + {}_{13}C_5)}{{}_{52}C_5}$

6) A & C ARE AGREE $P(A) = .2$



OUT OF FIRST 14 ASKED
4 AGREE!

eg. AAAADD...D \rightarrow PROB = $(.2)^4 (.8)^{14-4}$

BUT HOW MANY WAYS CAN WE ARRANGE THE A'S?

$$\Rightarrow {}_{14}C_4$$

SO $P(\text{EXACTLY 4 OF 1ST 14 AGREE}) = {}_{14}C_4 (.2)^4 (.8)^{10}$

NOW, $P(5 OUT OF 1ST 15 W/ 15TH BEING AGREE)$

$$= ({}_{14}C_4 (.2)^4 (.8)^{10}) (.2)$$

\uparrow
FOR 15TH!

SECOND EX.

1) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $P(A \cup B') = P(A) + P(B') - P(A \cap B')$ } ADD EQNS.

$$.7 + .9 = 2P(A) + (P(B) + P(B')) - (P(A \cap B) + P(A \cap B'))$$

$$1.6 = 2P(A) + 1 - P(A)$$

$$.6 = P(A)$$

2) TO FILL P, CHOOSE BETW. 300 STD. MULT. RULE

"	UP,	"	"	299	"	300 · 299 · 298 · 297 = ${}_{300}P_4$
"	T,	"	"	298	"	
"	C,	"	"	297	"	

3) TOTAL NO. POSS. OUTCOMES IN 10 TOSSES = $\underbrace{2 \cdot 2 \cdot \dots \cdot 2}_{10 \text{ flips}} = 2^{10}$
 $P(\text{HEAD}) = .5 \Rightarrow P(\text{TAIL}) = .5$

HHHHT...T $\text{PROB} = (.5)^4 (.5)^5 = (.5)^9$

4H IN 1ST 9 NO. ARRANG. OF 4H = ${}_9C_4 \Rightarrow {}_9C_4 (.5)^4 (.5)^5$

$P(4H \text{ OR } 10H \text{ AND}) = .5 = {}_9C_4 (.5)^{10}$