Sample Spaces

Ex. Roll 2 dice

Sample Space: All possible outcomes

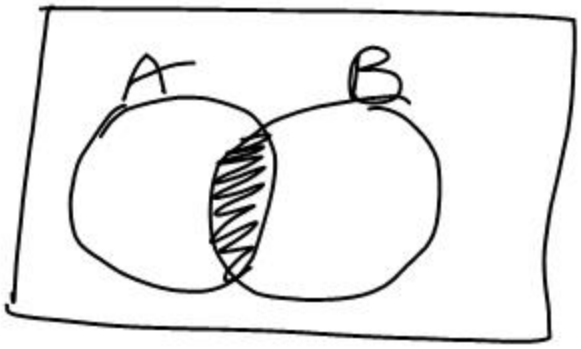
	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

Ex. $P(\text{at least 1 prime}) = \frac{27}{36} = \frac{3}{4}$

Ex. $P(\text{sum of 8 or more}) = \frac{15}{36} = \frac{5}{12}$

Intersection $A \cap B$

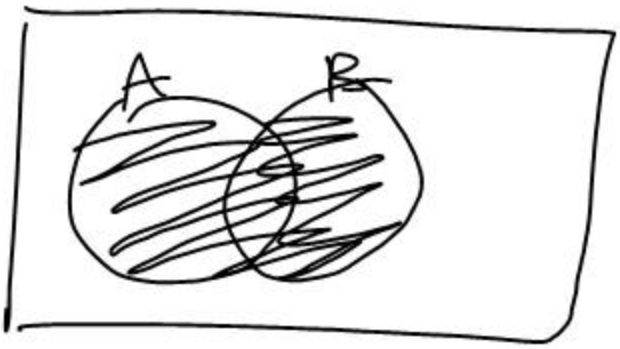
A and B



(d) $P(A \cap B) = \frac{4}{12} = \frac{1}{3}$

Union $A \cup B$

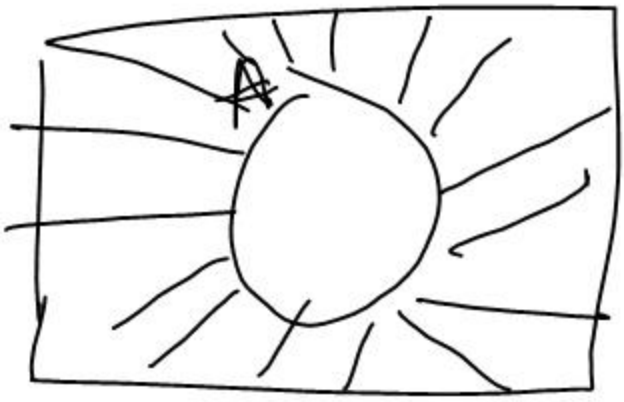
A or B



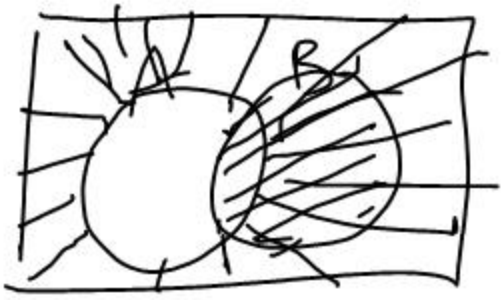
(c) $P(A \cup B) = \frac{10}{12} = \frac{5}{6}$

Complement A'

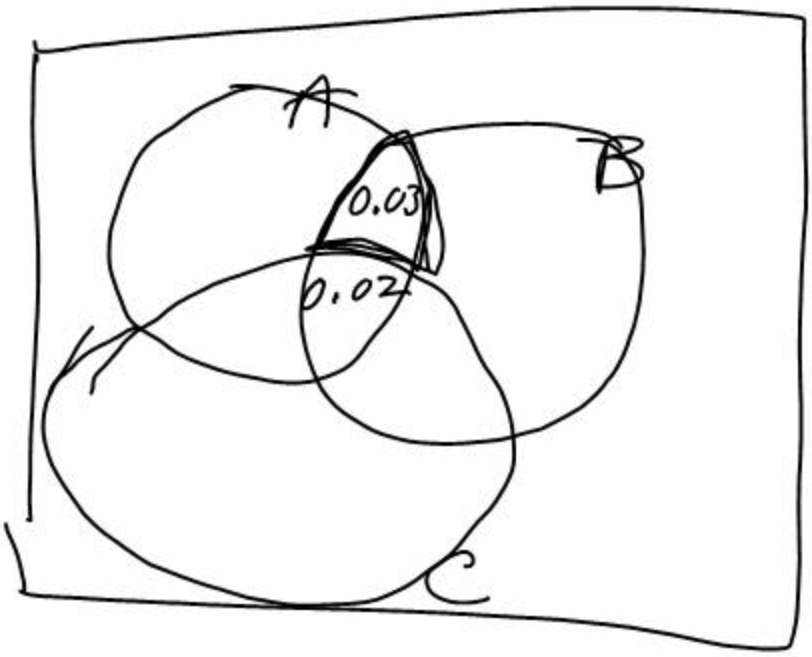
not A



(e) $P(A' \cup B) = \frac{10}{12}$

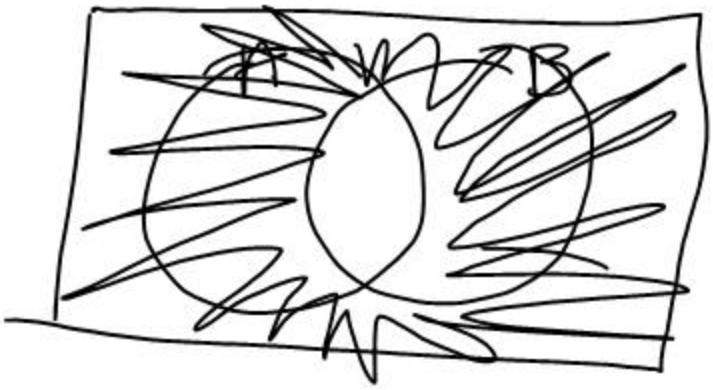


Ex. p. 304 #3



DeMorgan's Laws

① $(A \cap B)' \longleftrightarrow A' \cup B'$



② $(A \cup B)' = A' \cap B'$

Counting Problems

Ex. How many ways can we select 4 people from our class? (8 people)

$$\binom{8}{4} = \frac{8!}{4!\,(8-4)!}$$

$$= \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4!}{4! \cdot 4 \cdot 3 \cdot 2} = 70$$

6G #4 (a)

$$P(\text{all orange}) = \frac{\binom{5}{3}}{\binom{15}{3}} = \frac{10}{\frac{15 \cdot 14 \cdot 13}{3 \cdot 2}}$$

(# of successes; size of the sample space)

$$= \frac{2}{91}$$

(b) $P(\text{all diff colors}) = \dfrac{\binom{4}{1}\binom{5}{1}\binom{6}{1}}{\binom{15}{3}}$

(c) $P(\text{at least 1 green}) = \dfrac{\underbrace{\binom{4}{3}}_{\text{all green}} + \underbrace{\binom{4}{2}\binom{11}{1}}_{\text{2 greens}} + \underbrace{\binom{4}{1}\binom{11}{2}}_{\text{1 gre}}}{\binom{15}{3}}$

$= \dfrac{4 + 66 + 220}{455}$

$= \dfrac{290}{455} = \dfrac{58}{91}$

(c $\frac{1}{2}$) $1 - P(\text{no greens})$

$= 1 - \dfrac{\binom{11}{3}}{\binom{15}{3}} = 1 - \dfrac{165}{455}$

HW | 6E # 4,5

6F # 3, 4, 5

6G # 1, 2, 3, (5) read