

Statistics 1 Chapter 5:

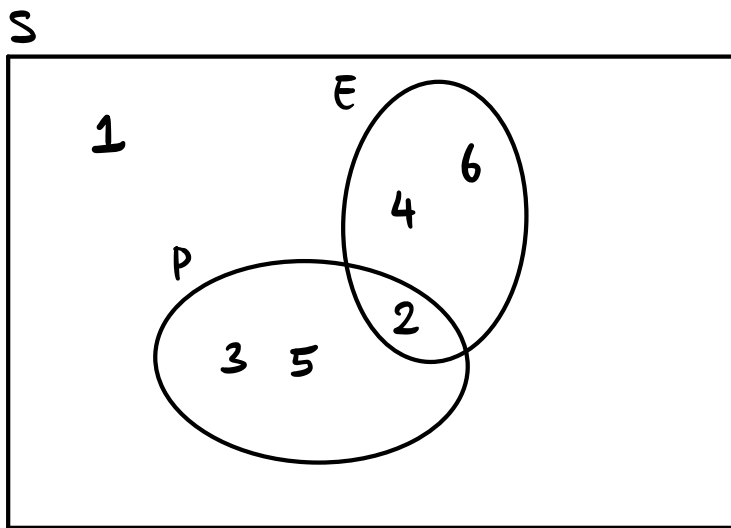
PROBABILITY

EXPERIMENT: A repeatable process that gives a number of outcomes

EVENT: 1 or more of these outcomes

SAMPLE SPACE: set of all the possible outcomes

Example: Dice rolling (VENN DIAGRAM)



S = sample space

E = even #

P = prime #

Example: Spinners (SAMPLE SPACE)

		Spinner 1			
		1	2	3	4
Spinner 2	1	2	3	4	5
	2	3	4	5	6
	3	4	5	6	7
	4	5	6	7	8

sum > 5 $P(>5) = \frac{6}{16} = \frac{3}{8}$

sum = 5 $P(5) = \frac{4}{16} = \frac{1}{4}$

Example: 40 Students (GROUPED DATA)

time (t) $5 \leq t < 7$ $7 \leq t < 9$ $9 \leq t < 11$ $11 \leq t < 13$ $13 \leq t < 15$

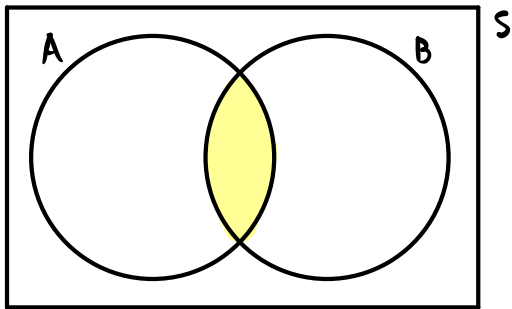
frequency 6 13 12 5 4

$$P(t < 9) = \frac{6+13}{40} = \frac{19}{40}$$

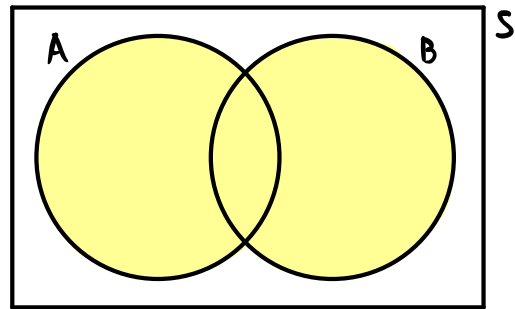
$$P(t > 10.5) = \frac{3+5+4}{40} = \frac{3}{10}$$

interpolation!

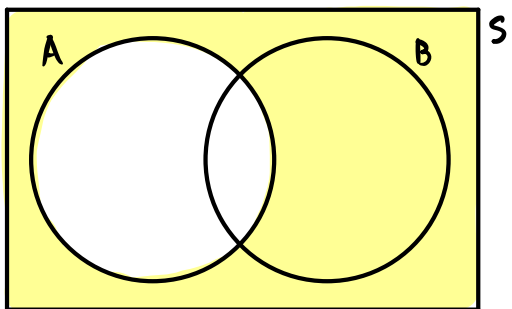
VENN DIAGRAMS:



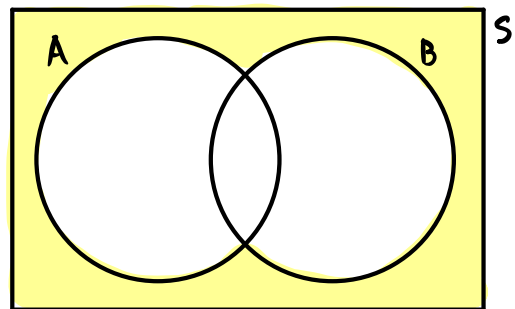
A AND B
($A \cap B$)



A OR B
($A \cup B$)

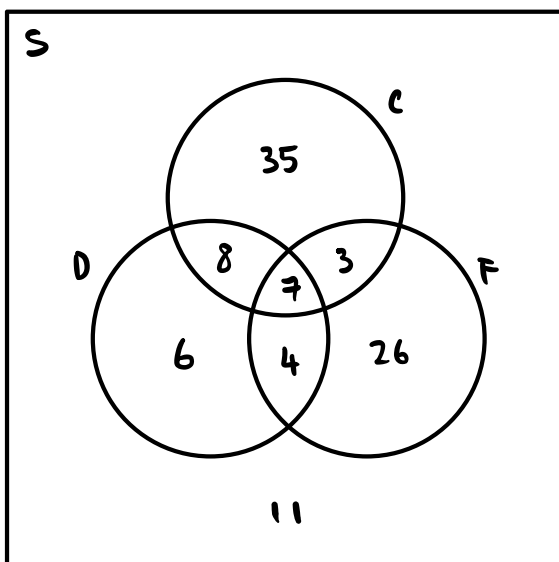


NOT A
(A')



NEITHER A NOR B
($(A \cup B)'$)

Example: vet (VENN DIAGRAM)



C: CATS
D: DOGS
F: FISH

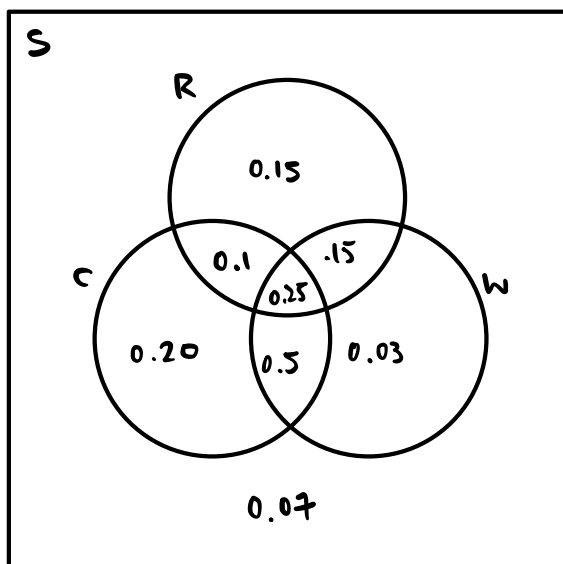
$$P(\text{Dogs only}) = \frac{6}{100} = \frac{3}{50}$$

$$P(\text{No fish}) = \frac{25+8+6+11}{100} = \frac{60}{100} = \frac{3}{5}$$

$$P(\text{No dogs, cats or tropical fish}) = \frac{11}{100}$$

65 run
 60 cycle
 30 swim & cycle
 25 do everything

48 swim
 40 run & swim
 35 run & cycle



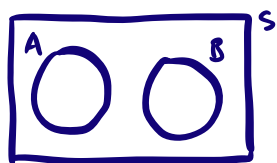
R: RUN
 C: CYCLE
 W: SWIM

BEST TO USE
 PROBABILITY!

IF A & B are mutually exclusive, they do not happen together
 (in a venn diagram, they don't overlap)

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

mutually exclusive



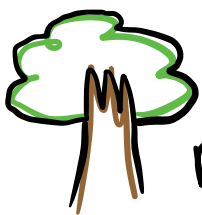
IF 2 events are independent, 1 event happening doesn't change the probability of another event happening

e.g. dice roll 1 & dice roll 2 are independent

picking balls out of bag without replacing is dependent

$$\underline{P(A) \times P(B) = P(A \cap B)}$$

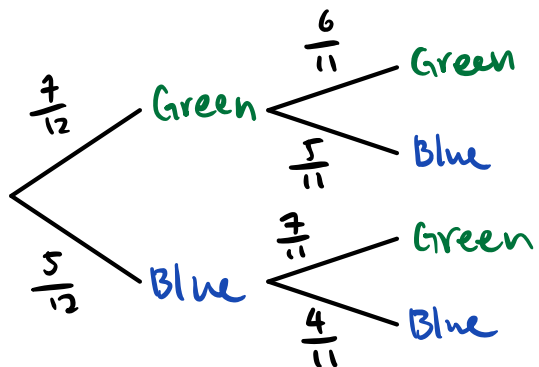
independent



Tree Diagrams

(for events that happen in succession)

Green & Blue beads in a bag:



multiply along the branch

$$P(2 \text{ greens}) = \frac{7}{12} \times \frac{6}{11} = \frac{7}{22}$$

$$P(\text{Different colours}) = \frac{7}{12} \times \frac{5}{11} + \frac{5}{12} \times \frac{7}{11} = \frac{35}{66}$$

multiply along the branch,
then add the branches