

12.1 Sets and Notation

Set: Ordered list of numbers

Universal Set: The set which you'll base all other sets off of

Example:

U = numbers 1-10

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

B = prime numbers 1-10

$$B = \{2, 3, 5, 7\}$$

A = numbers 1-5

$$A = \{1, 2, 3, 4, 5\}$$

C = even numbers 1-10

$$C = \{2, 4, 6, 8, 10\}$$

TERM	NOTATION	VENN DIAGRAM	EXAMPLE
Set C is a SUBSET of set B if every element of C is also an element of B.	$C \subset B$		$A \subset U$ $B \subset U$ $C \subset U$
The INTERSECTION of sets A and B is the set of all elements that are in both A and B.	$A \cap B$		$A \cap B = \{2, 3, 5\}$ $B \cap C = \{2\}$
The UNION of sets A and B is the set of all elements that are in A or B.	$A \cup B$		$A \cup B = \{1, 2, 3, 4, 5, 7\}$
The COMPLEMENT of set A is the set of all elements not in set A, but still in the universal set.	A^c		$A^c = \{6, 7, 8, 9, 10\}$ $B^c = \{1, 4, 6, 8, 9, 10\}$

- 1) Set A = The even integers less than or equal to 20
 Set B = The integers from 0-20 that are a multiple of 5
 Set C = The prime integers from 0-20
 Set D = The odd integers less than or equal to 10.

U = numbers 0-20

$$D = \{1, 3, 5, 7, 9\}$$

a) $A = \{0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$

b) $B = \{0, 5, 10, 15, 20\}$

c) $C = \{2, 3, 5, 7, 11, 13, 17, 19\}$

d) $D^c = \{0, 2, 4, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$

e) $A \cup B = \{0, 2, 4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20\}$

f) $B \cap C = \{5\}$

g) $A \cap D = \{3\} \emptyset$
 Empty set

g) $B \cup D = \{0, 1, 3, 5, 7, 9, 10, 15, 20\}$

g) $D \cup D^c = U$

h) $D \cap D^c = \emptyset$

* A set unioned with its complement gives you the universal set

* The intersection of a set and its complement is the empty set

Probability: $\frac{\text{possibilities}}{\text{total options}}$, or $\frac{\# \text{ in set}}{\# \text{ in universal}}$

Sample Space: The set of all possible outcomes
• universal set of probability

2) U=numbers 1-20

A=even numbers 1-20

B=multiples of 5 1-20

Identify each set. Then find each probability.

a) A

$$\{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$$

c) B

$$\{5, 10, 15, 20\}$$

e) B^c

$$\{1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19\}$$

g) $A \cup B$

$$\{2, 4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20\}$$

i) $(A \cup B)^c$

$$\{1, 3, 7, 9, 11, 13, 17, 19\}$$

k) $A \cap B$

$$\{10, 20\}$$

b) $P(A)$

$$\frac{10}{20} = \boxed{\frac{1}{2}}$$

d) $P(B)$

$$\frac{4}{20} = \boxed{\frac{1}{5}} *$$

f) $P(B^c)$

$$\frac{16}{20} = \boxed{\frac{4}{5}}$$

h) $P(A \cup B)$

$$\frac{12}{20} = \boxed{\frac{3}{5}}$$

j) $P(A \cup B)^c$

$$\frac{8}{20} = \boxed{\frac{2}{5}} *$$

l) $P(A \cap B)$

$$\frac{2}{20} = \boxed{\frac{1}{10}}$$

* The probability of a set and its complement will always add to 1.