

## 9.1 Sets and Notation

Set: Ordered list of numbers

Element: Individual number in a set

Example:

U = numbers 1-10

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

B = prime numbers 1-10

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

Universal Set: The set everything is based off of

A = numbers 1-5

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

C = even numbers 1-10

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

| Term         | Definition  | NOTATION            | VENN DIAGRAM | EXAMPLE   |
|--------------|---|---------------------|--------------|---|
| Subset       | All elements of one set are also part of another set                    | $B \subset C$       |              | $A \subset U$ $C \subset U$<br>$B \subset C$                                  |
| Intersection | Elements that are in both sets (overlap)                                | $A \cap B$<br>"and" |              | $A \cap B = \{2, 3, 5\}$ *<br>$B \cap C = \{2\}$                              |
| Union        | All elements of the sets combined in one<br>*Do not need to write twice | $A \cup B$<br>"or"  |              | $A \cup B = \{1, 2, 3, 4, 5, 7\}$<br>$B \cup C = \{2, 3, 4, 5, 6, 7, 8, 10\}$ |
| Complement   | All elements not in a set   | $A^c$               |              | $A^c = \{6, 7, 8, 9, 10\}$<br>$B^c = \{1, 4, 6, 9, 10\}$                      |

- 1) U = Integers 0-20  
 Set A = The even integers between 0 and 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.

\*If there is no intersection, the intersection is called the empty set  
 $\{ \}$  or  $\emptyset$

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

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

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

f)  $A \cap D = \{ \}$

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

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

h)  $D \cap D^c = \{ \}$

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

Probability:  $\frac{\text{How many ways something can happen}}{\text{Total \# of possible outcomes}}$

Sample Space: List of all possible outcomes  
ex: Rolling a die:  $\{1, 2, 3, 4, 5, 6\}$

- 2)  $U$  = numbers 1-20
- $A$  = even numbers 1-20
- $B$  = multiples of 5 1-20

Identify each set. Then find each probability.

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

b)  $P(A)$  ← elements in A  
 $\frac{10}{20} = \frac{1}{2}$  50%  
← elements in U

c)  $B$   
 $\{5, 10, 15, 20\}$

d)  $P(B)$   
 $\frac{4}{20} = \frac{1}{5}$  20%

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

f)  $P(B^c)$   
 $\frac{16}{20} = \frac{4}{5}$  80%

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

h)  $P(A \cup B)$   
 $\frac{12}{20} = \frac{3}{5}$  60%

i)  $(A \cup B)^c$   
 $\{1, 3, 7, 9, 11, 13, 17, 19\}$

j)  $P(A \cup B)^c$   
 $\frac{8}{20} = \frac{2}{5}$  40%

k)  $A \cap B$   
 $\{10, 20\}$

l)  $P(A \cap B)$   
 $\frac{2}{20} = \frac{1}{10}$  10%