

Subsets of a sample space

The intersection (\cap) of two sets is the set of all elements in both (their overlap)

The union (\cup) of two sets is the set of all elements in either one, or the other, or both.

The complement (\sim) of a set is the set of all elements that are NOT in a given set, but are still within the sample space of the problem.

EX. 1

Consider the sets of people defined below:

$$A = \{ \text{Abe, Bart, Homer, Lisa, Marge} \}$$

$$B = \{ \text{Bart, Lisa, Martin, Milhouse, Nelson, Ralph} \}$$

$$\text{i) } A \cup B = \{ \text{Abe, Bart, Homer, Lisa, Marge, Martin, Milhouse, Nelson, Ralph} \}$$

$$\text{ii) } A \cap B = \{ \text{Bart, Lisa} \}$$

EX. 2

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

$A = \{ \text{even numbers} \} = \{2, 4, 6, 8, 10\}$

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

i) $A \cup B = \{1, 2, 3, 4, 5, 6, 8, 10\}$

ii) $A \cap B = \{2, 4\}$

iii) $\sim A = \{1, 3, 5, 7, 9\}$

EX. 3

universe: $\{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t\}$

$A = \{b, d, f, k\}$

$B = \{l, m, n, k, q, a, t\}$

i) $A \cup B = \{a, b, d, f, k, l, m, n, q, t\}$

ii) $A \cap B = \{k\}$

iii) $\sim B = \{b, c, d, e, f, g, h, i, j, o, p, r, s\}$

iv) $\sim(A \cup B) = \{c, e, g, h, i, j, o, p, r, s\}$