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(1) Formal description of sets

a) $\{1, 3, 5, 7, \ldots\}$

→ Set of all odd natural numbers

b) $\{\ldots, -4, -2, 0, 2, 4, \ldots\}$

→ Set of all even integers

c) $\{n \mid n = 2m \text{ for some } m \text{ in } N\}$

→ Set of all natural numbers divisible by 2.

d) $\{n \mid n = 2m \text{ for some } m \text{ in } N \text{ and } n = 3k \text{ for some } k \text{ in } N\}$

→ Set of all natural numbers divisible by 2, 3 and 6.

e) $\{w \mid w \text{ is a string of 0's and 1's and } w \text{ equals the reverse of } w\}$

→ Set of string comprising of 0's and 1's and every string is a palindrome.

f) $\{n \mid n \text{ is an integer and } n = n+1\}$

→ Set contains no elements - empty set.

(2) Formal description of sets

a) The set containing the numbers 1, 10 and 100.

→ $\{n \mid n = 10^m \text{ for some } m \in \{0, 1, 2\}\}$

b) The set containing all integers that are greater than 5.

→ $\{n \mid n \text{ is an integer } Z \text{ and } n > 5\}$

c) The set containing all natural numbers that are less than 5.

→ $\{n \mid n \text{ is a natural number } N \text{ and } n < 5\}$

d) The set containing the string aba.

→ $\{aba\}$

e) The set containing the empty string.

→ $\{\epsilon\}$

f) The set containing nothing at all.

→ Null set ϕ.

(3) $A = \{x, y, z\}$
$B = \{x, y\}$

Union - OR
Intersection - AND

a) Is A a subset of B?

→ No. A contains $\{x, y, z\}$ and B doesn't contain element 'z'.
Therefore, A is a superset of B.

b) Is B a subset of A?

→ Yes, since all the elements of B are present in A.

c) What is A OR B?

→ $A \cup B = \{x, y, z\} \cup \{x, y\}$
$= \{x, y, z\}$

d) What is $A \setminus B$?

→ $A \cap B = \{x, y, z\} \cap \{x, y\}$
$= \{x, y\}$

e) What is $A \times B$?

$A \times B = \{(x,x), (x,y), (y,x), (y,y), (z,x), (z,y)\}$

f) What is the power set of B?

$2^2 = 4$.

$P(B) = \{\phi, \{x\}, \{y\}, \{x, y\}\}$.