Unit No. 3

Set and Functions

Exercise No. 3.1

Question No. 1

Write the following sets in set builder notation:

(i). {1,4,9,16,25,36,…,484}

Solution:

{1,4,9,16,25,36,…,484}

Writing set in set builder notation:

$= \{x|x = n^2, n \in N \wedge 1 \leq x \leq 500\}$

(ii). {2,4,8,16,…,256}

Solution:

{2,4,8,16,…,256}

Writing set in set builder notation:

$= \{x|x = 2^n, n \in N \wedge 1 \leq x \leq 256\}$

(iii). {0,±1,±2,…, ,±1000}

Solution:

{0,±1,±2,…, ,±1000}

Writing set in set builder notation:

$= \{x|x \in Z \wedge -1000 \leq x \leq 1000\}$

(iv). {6,12,18,…,120}

Solution:

{6,12,18,…,120}

Writing set in set builder notation:

$= \{x|x = 6n, n \in N \wedge 1 \leq n \leq 20\}$

(v). {100,102,104,…,400}

Solution:

{100,102,104,…,400}

Writing set in set builder notation:

$= \{x|x = 100 + 2n, n \in W \wedge 0 \leq n \leq 150\}$

(vi). {1,3,9,27,81,…}

Solution:

{1,3,9,27,81,…}

Writing set in set builder notation:

= { x|x = 3^n, n ∈ W}

(vii). {1,2,4,5,10,20,25,50,100}

Solution:

{1,2,4,5,10,20,25,50,100}

Writing set in set builder notation:

= { x|x is a divisor of 100 }

(viii). {5,10,15,…,100}

Solution:

{5,10,15,…,100}

Writing set in set builder notation:

= { x|x = $5n$, n ∈ N ^ 1 ≤ n ≤ 20 }

(ix). The set of all integers between -100 and 1000

Solution:

The set of all integers between -100 and 1000

Writing set in set builder notation:

= { x|x ∈ Z ^ -100 < x≤ 1000 }

Question No. 2

Write each of the following sets in tabular forms:

(i). {x|x is a multiple of 3 ^ $x \leq 35$}

Solution:

{x|x is a multiple of 3 ^ $x \leq 35$}

Writinging set in tabular form:

= {3,6,9,…,33}

(ii). {x|x∈R ^ 2x + 1 = 0}

Solution:

{x|x∈R ^ 2x + 1 = 0}

Writinging set in tabular form:

= {$-\frac{1}{2}$}

(iii). {x|x∈ P ^ x < 12}

Solution:

{x|x∈ P ^ x < 12}

Writinging set in tabular form:

= {2,3,5,7,11}

(iv). {x|x is a divisor of 128}

Solution:

{x|x is a divisor of 128}

Writinging set in tabular form:

= {1,2,4,8,16,32,64,128}

(v). {x|x = $2^n, n \in$ N ^n $<$ 8 }

Writinging set in tabular form:

= {2,4,8,16,32,64,128}

Solution:

{x|x = $2^n, n \in$ N ^n $<$ 8 }

Writinging set in tabular form:

= {2,4,8,16,32,64,128}

(vi). {x|x∈ N ^ x + 4 = 0}

Solution:

{x|x∈ N ^ x + 4 = 0}

Writinging set in tabular form:

= Φ or { }

(vii). {x|x∈ N ^ x = x}

Solution:

{x|x∈ N ^ x = x}

Writinging set in tabular form:

= {1,2,3,4,5,…}

(viii). {x|x∈ Z ^3x + 1 = 0}

Solution:

{x|x∈ Z ^3x + 1 = 0}

Writinging set in tabular form:

= { } or Φ

Question No. 3

Write two proper subsets of each of the following sets.

(i). {a,b,c}

Solution:

{a,b,c}

Two proper subsets of the given set:

= Φ, {a}

(ii). {0,1}

Solution:

{0,1}

Two proper subsets of the given set:

= Φ, {0}

(iii). N

Solution:

N

Two proper subsets of the given set:

= Φ, {1}

(iv). Z

Solution:

Z

Two proper subsets of the given set:

= Φ, {-1}

(v). Q

Solution:

Q

Two proper subsets of the given set:

= Φ, $\{-\frac{1}{2}\}$

(vi). R

Solution:

R

Two proper subsets of the given set:

= Φ, {0}

(vii). {x|x ∈ Q ^ 0 < x ≤ 2}

Solution:

{x|x ∈ Q ^ 0 < x ≤ 2}

Two proper subsets of the given set:

$= \Phi, \{\frac{3}{2}\}$

Question No. 4

Is there any set which has no proper subset? If so, name that set.

Answer:

Yes, there is a set which has no proper subset is Empty Set, [Φ or {}].

Question No. 5

What is difference between {a,b} and {{a,b}}?

Answer:

{a,b} is a set containing two elements *a* and *b* while {{a,b}} is a set containg only one element (singalton set) $\{a,b\}$.

Question No. 6

What is number of elements of the power set of each of following sets?

(i). { }

Solution:

{ }

No. of elements of given set = n = 0

No.of elements of the power set = 2^n

No.of elements of the power set = 2^0

No.of elements of the power set = 1

(ii). {0, 1}

Solution:

{ 0, 1}

No. of elements of given set = n = 2

No. of elements of the power set = 2^n

No. of elements of the power set = 2^2

No. of elements of the power set = 4

(iii). {1,2,3,4,5,6,7}

Solution:

{ 1,2,3,4,5,6,7}

No. of elements of given set = n = 7

No. of elements of the power set = 2^n

No. of elements of the power set = 2^7

No. of elements of the power set = 128

(iv). {0,1,2,3,4,5,6,7}

Solution:

{ 0,1,2,3,4,5,6,7}

No. of elements of given set = n = 8

No. of elements of the power set = 2^n

No. of elements of the power set = 2^8

No. of elements of the power set = 256

(v). {a,{b,c}}

Solution:

{ a,{b,c}}

No. of elements of given set = n = 2

No. of elements of the power set = 2^n

No. of elements of the power set = 2^2

No. of elements of the power set = 4

(vi). {{a,b},{b,c},{d,e}}

Solution:

{{a,b},{b,c},{d,e} }

No. of elements of given set = n = 3

No. of elements of the power set = 2^n

No. of elements of the power set = 2^3

No. of elements of the power set = 8

Question No. 7

Write down the power set of each of the following sets.

(i). {9,11}

Solution:

{9,11}

Let:

A = {9,11}

No. of elements of given set = n = 2

No. of elements of the power set = 2^n

No. of elements of the power set = $2^2 = 4$

P(A) = {Φ,{9},{11},{9,11}}

(ii). {+,-,×,÷}

Solution:

{+,-,×,÷}

Let:

B = {+,-,×,÷}

No. of elements of given set = n = 4

No. of elements of the power set = 2^n

No. of elements of the power set = $2^4 = 16$

P(B) = {Φ,{+},{-},{×},{÷} ,{+,-} ,{+, ×} ,{+, ÷} ,{-, ×} ,{-, ÷} ,{×,÷} ,{+,-, ×} ,{+,-, ÷} ,{+, ×,÷} ,{-, ×,÷} ,{+,-, ×,÷}}

(iii). {Φ}

Solution:

{Φ}

Let:

C = {Φ}

No. of elements of given set = n = 1

No. of elements of the power set = 2^n

No. of elements of the power set = $2^1 = 2$

P(C) = {Φ,{Φ}}

(iv). {a,{b,c}}

Solution:

{a,{b,c}}

Let:

D = {a,{b,c}}

No. of elements of given set = n = 2

No. of elements of the power set = 2^n

No. of elements of the power set = $2^2 = 4$

P(D) = {Φ,{a},{{b,c}},{a,{b,c}}}