Topic 2.

Sets. Operations on Sets

Set something one common to the feature have has been different natural objects complex is considered Various to nature have has been objects while of the Set elements are called.

Markings

Sets : $A, B, C, ...,$

Set elements : $a, b, c, ...,$

Empty set - $\varnothing$

Universal set - U

Definition 2.1. Limited of the Set elements the number this of the Set **power** is called

Given A of the Set power $|A|$ in the form of is determined.

An example . The following Sets given be : $A = \{a\}$, $B = \{a, b\}$, $C = \{a, b, c, d, e\}$, $D = \{1, 2, 3, ..., n\}$, $E = \{m \mid m = 2z\}$, $F = \{2, 3, 5, 7, ..., p, ...\}$, this is on the ground n - natural number, z - whole number, p - prime number. Given six from the Set four - A, B, C and D Sets finite , E and F Sets while infinite are Sets . From this except, $|A| = 1$, $|B| = 2$, $|C| = 5$ and $|D| = n$ will be

Definition 2.2. If B of the Set every element A also available in the Set if, then B Set A of the Set, **part** is called a **set**.

B Set A of the Set, part Set the fact that $B \subseteq A$ or $A \supseteq B$ in the form is determined.

Operations on Sets

How are two of the Sets all from the elements compiled without repetition to the Set of Sets union called? $A \cup B$ such as is defined (Fig. 2.1).

How two of the Sets Are all common from the elements made up to the Set of Sets intersection. $A \cap B$ such as is determined (Fig. 2.2).

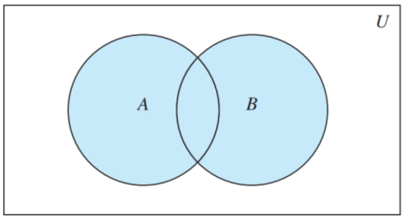

Figure 2.1

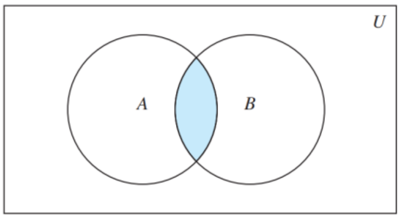

Figure 2.2

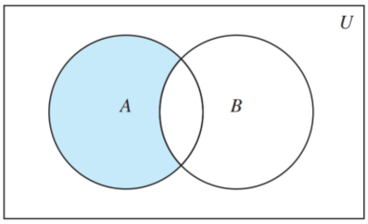

Figure 2.3

A set B set was not all from the elements to be built the package harvest to do A from **set** B **the package subtraction** is called Structured set and this one A and B **of sets the difference** that is $A \setminus B$ called such as is determined (Figure 2.3).

A and B of sets **symmetrical the difference** that A set B to the pile , B set A set belongs to was not from the elements consists of set it is said and $A \Delta B$ such as is determined . So by $A \Delta B = A \oplus B = (A \setminus B) U (B \setminus A)$ doing $A \Delta B$ or $A \oplus B$ will be

➢ Sets for main equalities

1. $\overline{\overline{A}} = A$
2. $A \cap B = B \cap A$ - to multiplication relatively commutativity law
3. $(A \cap B) \cap C = A \cap (B \cap C)$ - to multiplication relatively associativity the law
4. $A \cup B = B \cup A$ - to sum relatively commutativity the law
5. $(A \cup B) \cup C = A \cup (B \cup C)$ - to sum relatively associativity the law
6. $A \cap (A \cup B) = (A \cap B) \cup (B \cap C)$ to multiplication relatively distributiveness the law
7. $A \cup (B \cap C) = (A \cup B) \cap (B \cup C)$ - to sum relatively distributiveness the law
8. $A \cap A = A$
9. $A \cap U = A$
10. $A \cup A = A$
11. $A \cup U = A$

➢ Sets Cartesian multiple

2.3 : A of the Set elements first , B of the Set elements second by doing made up all couples Set A and B of Sets **right multiple** or **Cartesian** is called a **multiplier** and AxB such as is determined .

Descartes do not multiply couples small brackets into is written . For example , $A=\{2;3\}$ and $B=\{1;2;4\}$ if their Cartesian multiple $A\times B=\{(2;1),\ (2;2),\ (2;4),\ (3;1),\ (3;2),\ (3;4)\}$ will be

Solved from examples samples

Example 2.1. $U=\{1,2,3,4,5,6,7,8,9,10\}$, $A=\{1,2,4,5,6,10\}$, $B=\{5,6,7,9,10\}$ Sets given if , the following Set elements define :

$a)\,\overline{A};$
$b)\,A\cup B;$
$c)\,A\cap B;$
$d)\,A\setminus B;$
$e)\,B\setminus A.$

<u>Solution :</u>

a) $\overline{A}$ Set elements to determine for $U\setminus A$ is found . That is, a universal set from the elements A Set elements out thrown away

$$\overline{A}=\{x\in U\,|\,x\notin A\}=U\setminus A=\{3,7,8,9\}$$

b) A and B of Sets all from the elements made up Set defined as :

$$A\cup B=\{1,2,4,5,6,7,9,10\};$$

c) A and B of Sets from common (both have) elements made up Set defined as : $A\cap B=\{5,6,10\};$

d) A of the Set B in the Set there is didn't happen from the elements made up Set defined : $A\setminus B=\{1,2,4\}$;

e) B of the Set A in the Set there is didn't happen from the elements made up Set is determined : $B\setminus A=\{9\}$.

Example 2.2. $A=\{5,2,7,9\}$, $B=\{2,4,11,7,13\}$ Sets given if , this of Sets symmetrical the difference $A\Delta B$ find

Solution :

A and B of Sets symmetrical the difference to determine for $(A \cup B) \setminus (A \cap B)$ to find enough The reason $A \Delta B = (A \cup B) \setminus (A \cap B)$ to equal to From this $A \cup B = \{2,4,5,7,9,11,13\}$ and $A \cap B = \{2,7\}$ because it was

$$A \Delta B = (A \cup B) \setminus (A \cap B) = \{4,5,9,11,13\}$$

will be

Example 2.3. $A = \{x : |x-7| < 4, x \in N\}$ of the Set $|A|$ power count

Solution :

A Set power to determine for initially ,$|x-7| < 4$ inequality solve need will be This inequality the solution as follows :

$$-4 < x - 7 < 4$$

$$3 < x < 11$$

So , $A = \{4,5,6,7,8,9,10\}$ Set elements the number is 7 equal to From this come it turns out that .$|A| = 7$

Example 2.4. $A = \{1,3,5\}$ of the Set all part Sets write Part from Sets special and not special part Sets separate show me

Solution :

A of the Set all possible has been part Sets the number $2^{|A|}$ from the formula used and found . In this $A = \{\overset{1}{1}, \overset{2}{3}, \overset{3}{5}\}$ set to 3 elements have that it was for his power $|A| = 3$ will be In it A of the Set part Sets the number

$$2^{|A|} = 2^{|3|} = 8$$

the fact that come comes out A set all part packages below cited :

$$A_1 = \{1,3,5\};$$
$$A_2 = \{1,3\};$$
$$A_3 = \{1,5\};$$
$$A_4 = \{3,5\};$$
$$A_5 = \{1\};$$
$$A_6 = \{3\};$$
$$A_7 = \{5\};$$
$$A_8 = \{\varnothing\}.$$

From this A of the Set not special part Sets the following :

$$A_1 = \{1,3,5\} \text{ and } A_8 = \{\varnothing\}.$$

All empty didn't happen in Sets his not special part Sets the number is 2 equal to will be

$$\left| A \text{ to'plam xosmas qism to'plamlar soni} \right| = 2.$$

That is , this of the Set himself and empty from the Set consists of will be Therefore , A the Set special part Sets the number common part Sets from number not special part Sets the number separated equal to will be :

$$\left| A \text{ to'plam xos qism to'plamlar soni} \right| = 2^{|3|} - 2 = 8 - 2 = 6$$

This A of the Set special part Sets the following :

$$A_2 = \{1,3\};\ A_3 = \{1,5\};\ A_4 = \{3,5\};\ A_5 = \{1\};\ A_6 = \{3\};\ A_7 = \{5\};$$

A set not special part packages while the following :

$$A_1 = \{1,3,5\} \text{ and } A_8 = \{\varnothing\}.$$

Example 2.5. $A = \{1,3\}$, $B = \{2,4,6\}$ Sets given let it be This of Sets Cartesian find the product .

Solution :

A and B of Sets Cartesian multiplication to find for A of the Set elements first , B Set elements second by doing made up couples Set harvest is done (Fig. 2.4):

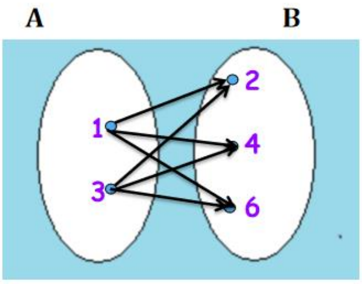

Figure 2.4

$$A \times B = \{(1,2),(1,4),(1,6),(3,2),(3,4),(3,6)\}.$$

Independent work for issues

2.1 $A = \{a,b,c,d,e,f\}$ and $B = \{b,d,e,g,h\}$ Sets given $A \cap B = ?$

2.2 $A = \{a,b,c,d,e,f\}$ and $B = \{b,d,e,g,h\}$ Sets given $A \cup B = ?$

2.3 $A = \{1,2,3,4,5\}, B = \{0,3,6\}$ Sets given if so , the following define :

$a) A \cup B;$

$b) A \cap B;$

$c) A \setminus B;$

$d) B \setminus A.$

2.4 $A-$ two room numbers set , $B-$ two room couple numbers Set if , this Sets how relationship with connected .

2.5 $A = \{0,2,3\}, B = \{0,1,2,3,4\}$ of Sets symmetrical find the difference . $A \Delta B = ?$

2.6 $A = \left\{ x \middle| -\frac{2}{3} \le x \le \frac{7}{4} \right\}, B = \left\{ x \middle| -\frac{1}{4} \le x \le 2 \right\}$ of Sets find the intersection .

2.7 $A = \{x | -5 \le x \le 10\}, B = \{x | x \in N, 3 \le x \le 15\}$ Sets given let it be

$a) A \setminus B;$

$b) B \setminus A;$

$c) A \Delta B$

Set find the elements .

2.8 $A = \{x | x \in N, x^2 > 12\}$ from 100 of the set small has been all natural numbers Set make up

2.9 $A=\{x|x\in N, x\le 3\}$ and $B=\{x|(x-1)(x-2)(x-3)=0\}$ this of Sets equal to or equal to that it is not show me

2.10 X set of 16 small prime numbers if , the set power $|X|$ find the

2.11 $A=\{1;3;5;6;8;10\}$ and $B=\{5,6,7,8,10\}$ Sets given $|A\cup B|$ Set power define

2.12 $X=\{x|x\in N, 5\le x^2\le 38\}$ of the Set part Sets find the number

2.13 $A=\{1,2,3,4,5,6,7,8,9,10\}$, $B=\{2,4,6,8,10\}$ and $C=\{3,6,9\}$ Sets given $A/(B\cup C)=?$

2.14 $A=\{1,2,3,4,5,6,7,8,9,10\}$, $B=\{2,4,6,8,10\}$ and $C=\{3,6,9\}$ Sets given $A/(B\cap C)=?$

2.15 The following one at the time sets A and B satisfying define :

$1) A\cup B=\{1,2,3,4,5\};$

$2) A\cap B=\{3,4,5\};$

$3) 1\notin A\setminus B;$

$4) 2\notin B\setminus A.$

2.16 The following Sets given :

$$A=\left\{x\in R\left|\begin{cases}2x\le 4x-6\\ 4x-11<2x+1\end{cases}\right.\right\} \text{ and } B=A\cap N.$$

$a) B\cup X=\{3,4,5,6,7,8,9\}$ the satisfying all possible X sets of identify

$b) Y=\{y\in Z|y^2\in B\cup X\}, B\cap Y=\{3\}$ the satisfying all possible Y sets that are define

2.17 If $T=\{1,2,3,4,5,6\}$, $A\Delta C=\{1,2\}$, $B\Delta C=\{5,6\}$, $A\cap C=B\cap C=\{3,4\}$ s are given if $A,B,C\subseteq T$ Sets and $A\Delta B$ symmetrical find the difference .

2.18 $A=\{1,2\}$, $B=\{2,3\}$ Sets given This of Sets $A\times B$ Cartesian find the product .

2.19 $A=\{3,4\}$, $B=\{4,8\}$ Sets given This Sets for the following define :

$$(A\times B)\cap(B\times A).$$

2.20 $A=\{5,6\}$, $B=\{6,7\}$ Sets given This Sets for $(A\cup B)\times B$ Cartesian multiplier define

2.21 $A=\{1,2,x\}$, $B=\{3,4,y\}$ Sets given If $\{1,3\}\times\{2,4\}\subseteq A\times B$ the fact that known if x and y the define

2.22 To Sets belongs to of elements characteristic features show :

$$A = \{4, 7, 10\}, B = \{3, 6, 12\}, C = \{1, 4, 9, 16, 25\}, D = \{1, 8, 27, 64, 125\}.$$

2.23 $X = \{x | x \in N, x^2 \leq 20\}$ of the Set special and not special part Sets separate show me

2.24 $A = \{1, 2, 3, 4\}$ Set given let it be

a) A of the Set all part Sets write

b) A of the Set special part Sets the number define

c) A of the Set not special part Sets the number define

2.25 $X = \{x | x \in N, -2 \leq x \leq 5\}$ of the Set part Sets the number define and from him special part Sets the number separate show me

Answers

2.1. $A \cap B = \{b, d, e\}$

2.2. $A \cup B = \{a, b, c, d, e, f, g, h\}$

2.3. a $A \cup B = \{0,1,2,3,4,5,6\}$) b $A \cap B = \{3\}$) c $A \setminus B = \{1,2,4,5\}$) d $B \setminus A = \{0,6\}$)

2.4. $B \subset A$;

2.5. $A\Delta B = \{1,4\}$

2.6. $A \cap B = B = \left\{ x \middle| -\frac{1}{4} \le x \le 2 \right\}$

2.7. a $A \setminus B = \{x | -5 \le x < 3\}$) b $B \setminus A = \{x | 10 < x \le 15\}$) c $A\Delta B = (A \setminus B) \cup (B \setminus A)$)

2.8. $A = \{x | x \in N, 4 \le x \le 100\}$

2.9. Sets equal to

2.10. 6

2.11. 4

2.12. 64

2.13. $A / (B \cup C) = \{1,5,7\}$

2.14. $A / (B \cap C) = \{1,2,3,4,5,7,8,9,10\}$

2.15. $A = \{2,3,4,5\}$ **,** $B = \{1,3,4,5\}$

2.21. $x = 3, y = 2$

2.22. $A = \{x | x \in N, x+3\}, B = \{x | x \in N, 3x\}, C = \{x | x \in N, x^2\}, D = \{x | x \in N, x^3\}$

2.23. Hos part Sets :

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

Hosmas part Sets : $\{\varnothing\}, \{1,2,3,4\}$

2.24. a) Part Sets :

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

b) 14; c) 2;

2.25. Part Sets number 32, characteristic part Sets the number is 30.