# Решения на задачите от глава 18 на книгата "Въведение в програмирането със C#"

Предлагаме ви решения на задачите от [книгата "Въведение в програ­мирането със C#"](http://www.introprogramming.info), заедно с анализ на задачите, описание на използва­ните идеи, алгоритми, подходи за решаване и тестове.

## Авторски колектив

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| Задача 1. Брой срещания на числата от дадена редица | |
| **Условие**  Напишете програма, която брои колко пъти се среща всяко число в дадена редица от числа.  Пример: 3 4 4 2 3 3 4 3 2  Резултат:  2 - 2 times  3 - 4 times  4 - 3 times | |
| **Описание на входа**  Входните данни се въвеждат като поредица от числа, на един единствен ред, разделени едно от друго с единичен интервал. | |
| **Описание на изхода**  Изходът се извежда като последтователност от редове, всеки от които е в следния формат: "n – m times", където n е поредното число, а m е броят срещания. Редовете да са сортирани по съответните числа от редицата в нарастващ ред, както е дадено в примера. | |
| **Анализ на задачата**  Използвайте SortedDictionary<int, int>, където ключ е числото от редицата, а стойност е съответният брой срещания. Обходете елементите на редицата и за всяко число проверявайте дали вече присъства речника. Ако отговорът е да, увеличете старата стойност с 1, за да преброите новото срещане на числото. Ако отговорът е не, добавете нов запис в речника с ключ поредното число и стойност 1 (броим първото срещане). | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  class NumbersOccurrencesCountFinder  {  static void Main(string[] args)  {  string sequenceInputLine = Console.ReadLine();    SortedDictionary<int, int> numbersOccurrencesCount =  FindNumbersOccurrencesCount(sequenceInputLine);  PrintNumbersOccurrences(numbersOccurrencesCount);  }    private static SortedDictionary<int, int> FindNumbersOccurrencesCount(string sequenceInputLine)  {  string[] tokens = sequenceInputLine.Split(new char[] { ' ' },  StringSplitOptions.RemoveEmptyEntries);  SortedDictionary<int, int> numbersOccurrencesCount = new SortedDictionary<int, int>();  foreach (string token in tokens)  {  int number = int.Parse(token);  int count;  if (!numbersOccurrencesCount.TryGetValue(number, out count))  {  count = 0;  }  numbersOccurrencesCount[number] = count + 1;  }  return numbersOccurrencesCount;  }  private static void PrintNumbersOccurrences(  SortedDictionary<int, int> numbersOccurrencesCount)  {  foreach (KeyValuePair<int, int> numberEntry in numbersOccurrencesCount)  {  Console.WriteLine("{0} - {1} times", numberEntry.Key, numberEntry.Value);  }  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * Само едно число като вход * Едно и съшо число, повторено многократно * 10000 числа | |
| **Вход** | **Изход** |
| 3 4 4 2 3 3 4 3 2 | 2 - 2 times  3 - 4 times  4 - 3 times |
| **Вход** | **Изход** |
| 1 2 3 4 5 6 7 8 9 9 8 7 6 5 4 3 2 1 | 1 - 2 times  2 - 2 times  3 - 2 times  4 - 2 times  5 - 2 times  6 - 2 times  7 - 2 times  8 - 2 times  9 - 2 times |
| **Вход** | **Изход** |
| 1 2 3 2 3 4 5 6 4 4 5 5 6 6 6 7 8 9 | 1 - 1 times  2 - 1 times  3 - 1 times  6 - 2 times  7 - 1 times  8 - 1 times  9 - 1 times  10 - 1 times  11 - 1 times  13 - 3 times  14 - 2 times  15 - 3 times  16 - 1 times  19 - 1 times  20 - 2 times  22 - 2 times  24 - 1 times  27 - 1 times  29 - 1 times |
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| Задача 2. Премахване на числа, които се срещат нечетен брой пъти, от редица | |
| **Условие**  Напишете програма, която премахва всички числа, които се срещат нечетен брой пъти в дадена редица. Например, ако имаме началната редица {4, 2, 2, **5**, 2, **3**, 2, **3**, 1, **5**, 2, 6, 6, 6}, трябва да я редуцираме до редицата {5, 3, 3, 5}. | |
| **Описание на входа**  Входните данни се въвеждат като поредица от числа, на един единствен ред, разделени едно от друго с единичен интервал. | |
| **Описание на изхода**  Изходът се извежда като поредица от числа на един ред с интервали между тях. | |
| **Анализ на задачата**  Вкарайте всички числа в ArrayList. Използвайте SortedDictionary<int, int>, където ключ е числото от редицата, а стойност е съответният брой срещания. Обходете елементите на редицата и за всяко число проверявайте дали вече присъства речника. Ако отговорът е да, увеличете старата стойност с 1, за да преброите новото срещане на числото. Ако отговорът е не, добавете нов запис в речника с ключ поредното число и стойност 1 (броим първото срещане).  Обходете отново редицата като за всяко число проверявате в речника дали се среща нечетен брой пъти. Ако отговорът е не, отпечатайте числото, разделено от следващото с интервал. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  class OddCountOccurringNumbersRemover  {  static void Main(string[] args)  {  string sequenceInputLine = Console.ReadLine();  ArrayList sequence = ExtractNumbers(sequenceInputLine);  Dictionary<int, int> numbersOccurrencesCount =  ExtractNumbersOccurrencesCount(sequence);  PrintOddlyOccuringNumbers(sequence, numbersOccurrencesCount);  }  private static ArrayList ExtractNumbers(string numbersLine)  {  string[] tokens = numbersLine.Split(new char[] { ' ' },  StringSplitOptions.RemoveEmptyEntries);  ArrayList sequence = new ArrayList();  foreach (string token in tokens)  {  int number = int.Parse(token);  sequence.Add(number);  }  return sequence;  }  private static Dictionary<int, int> ExtractNumbersOccurrencesCount(ArrayList sequence)  {  Dictionary<int, int> numbersOccurrencesCount = new Dictionary<int, int>();  foreach (int number in sequence)  {  int count;  if (!numbersOccurrencesCount.TryGetValue(number, out count))  {  count = 0;  }  numbersOccurrencesCount[number] = count + 1;  }  return numbersOccurrencesCount;  }  private static void PrintOddlyOccuringNumbers(ArrayList sequence,  Dictionary<int, int> numbersOccurrencesCount)  {  foreach (int number in sequence)  {  if (numbersOccurrencesCount[number] % 2 == 0)  {  Console.Write("{0} ", number);  }  }  Console.WriteLine();  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * Едно и съшо число, повторено четен брой пъти * Едно и съшо число, повторено нечетен брой пъти * 10000 числа | |
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| **Вход** | **Изход** |
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| **Вход** | **Изход** |
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| Задача 3. Брой срещания на думи | |
| **Условие**  Напишете програма, която по подаден текст преброява колко пъти се среща всяка дума. Отпечатайте на конзолата всички думи и по колко пъти се срещат, подредени по брой срещания.  Пример: "This is the TEXT. Text, text, text – THIS TEXT! Is this the text?"  Резултат:  is – 2  the – 2  this – 3  text - 6 | |
| **Описание на входа**  Входните данни се въвеждат като редове от конзолата. Въвеждането спира до срещанто на празен ред. Всеки от редовете представлява поредица от думи, разделени една от друга с интервал, запетая, тире, точка, двоеточие, точка и запетая, въпросителен или удивителен знак. | |
| **Описание на изхода**  Изходът се извежда като последтователност от редове, всеки от които е в следния формат: "word – m times", където word е поредната дума, а m е броят срещания. Редовете да са сортирани по броя срещания в нарастващ ред, както е дадено в примера. | |
| **Анализ на задачата**  Използвайте SortedDictionary<string, int>, където ключ е дума от текста, а стойност е съответният брой срещания. Обходете думите от всеки ред и за всяка дума проверявайте дали вече присъства речника. Ако отговорът е да, увеличете старата стойност с 1, за да преброите новото срещане на думата. Ако отговорът е не, добавете нов запис в речника с ключ поредната дума и стойност 1 (броим първото срещане).  След като преброите всички думи, сортирайте речника по стойност (използвайте LINQ заявка – потърсете в интернет за LINQ заявките). | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Linq;  class WordsOccurrencesCounter  {  static void Main(string[] args)  {  SortedDictionary<string, int> wordsOccurencesCount = new SortedDictionary<string, int>();  ExtractWordsOccurencesCount(wordsOccurencesCount);  PrintOrderedWordsOccurrencesCount(wordsOccurencesCount);  }  private static void ExtractWordsOccurencesCount(SortedDictionary<string, int> wordsOccurences)  {  string inputLine = Console.ReadLine();  while (inputLine != string.Empty)  {  string[] tokens = inputLine.Split(new char[] { ' ', ',', '-', '.', ':', ';', '?', '!' },  StringSplitOptions.RemoveEmptyEntries);  foreach (string word in tokens)  {  string wordToLower = word.ToLower();  int count;  if (!wordsOccurences.TryGetValue(wordToLower, out count))  {  count = 0;  }  wordsOccurences[wordToLower] = count + 1;  }  inputLine = Console.ReadLine();  }  }  private static void PrintOrderedWordsOccurrencesCount(  SortedDictionary<string, int> wordsOccurencesCount)  {  var orderedWords = wordsOccurencesCount.OrderBy(a => a.Value);  foreach (KeyValuePair<string, int> pair in orderedWords)  {  Console.WriteLine("{0} -> {1}", pair.Key, pair.Value);  }  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * Текст с над 1000 думи | |
| **Вход** | **Изход** |
| This is the TEXT. Text, text, text – THIS TEXT! Is this the text? | is – 2  the – 2  this – 3  text - 6 |
| **Вход** | **Изход** |
| C# is a type-safe, object-oriented language that is simple yet powerful, allowing programmers to build a breadth of applications. Combined with the .NET Framework, Visual C# enables the creation of Windows applications, Web services, database tools, components, controls, and more. | allowing -> 1  breadth -> 1  build -> 1  combined -> 1  comp -> 1  creation -> 1  database -> 1  enables -> 1  framework -> 1  language -> 1  net -> 1  object -> 1  oriented -> 1  powerful -> 1  programmers -> 1  safe -> 1  services -> 1  simple -> 1  that -> 1  to -> 1  tools -> 1  type -> 1  visual -> 1  web -> 1  windows -> 1  with -> 1  yet -> 1  a -> 2  applications -> 2  c# -> 2  is -> 2  of -> 2  the -> 2 |
| **Вход** | **Изход** |
| Combined with the .NET Framework, Visual C# enables the creation of Windows applications, Web services, database tools, components, controls, and more. | and -> 1  applications -> 1  c# -> 1  combined -> 1  components -> 1  controls -> 1  creation -> 1  database -> 1  enables -> 1  framework -> 1  more -> 1  net -> 1  of -> 1  services -> 1  tools -> 1  visual -> 1  web -> 1  windows -> 1  with -> 1  the -> 2 |
| **Вход** | **Изход** |
| The quick brown fox jumps over the lazy dog | brown -> 1  dog -> 1  fox -> 1  jumps -> 1  lazy -> 1  over -> 1  quick -> 1  the -> 2 |
| **Вход** | **Изход** |
| When multiple equal items are stored in the bag, they are stored as a representative item and a count. | and -> 1  as -> 1  bag -> 1  count -> 1  equal -> 1  in -> 1  item -> 1  items -> 1  multiple -> 1  representative -> 1  the -> 1  they -> 1  when -> 1  a -> 2  are -> 2  stored -> 2 |
| **Вход** | **Изход** |
| This is the input TEXT. Text, text, text – THIS IS INPUT TEXT! Is this the output text? | output -> 1  input -> 2  the -> 2  is -> 3  this -> 3  text -> 6 |
| **Вход** | **Изход** |
| nicer,C#:I?world;better.nicer Text.nica,world!Hello:bala bala,I.world!nicer;nicer,nice better best-best:nica.the:nice even!ala:nicer,ala!nice best-better.world the-better:am?nicer:nica-ala world?nicer;world.even am-best:bala;I;even?world:nica;world?better nice!TEXT;word:bala,this this.better.even!is?Text-Hello best,even.I:better;world am.better?C#.I:Hello!Text nica.ala!I-nica;is:nice the-am,nicer;word?Hello;this nicer!better- | c# -> 2  is -> 2  word -> 2  the -> 3  this -> 3  ala -> 4  am -> 4  bala -> 4  hello -> 4  text -> 4  best -> 5  even -> 5  nice -> 5  i -> 6  nica -> 6  better -> 9  nicer -> 9  world -> 9 |
| **Вход** | **Изход** |
| nice!word!C#:nica!is,am,the:C# is-nice.bala;best!am-the;even.I better.best,am nicer-word the,best:Text-nicer is.word;better,the ala!this:nica TEXT,TEXT:Hello-is:nice.bala.nicer!best.ala;the;better world,nicer!bala:the?nicer?this even!C#;I:is,better is.world,world;am nice Hello!better am:bala,nice better.the!C ,Text.I:bala?nicer:is is,bala.am C#!Text?nica!am-Hello:world C#-Hello.I-Hello:ala- | c -> 1  even -> 2  this -> 2  ala -> 3  nica -> 3  word -> 3  best -> 4  i -> 4  world -> 4  c# -> 5  hello -> 5  nice -> 5  text -> 5  bala -> 6  better -> 6  nicer -> 6  am -> 7  the -> 7  is -> 8 |
| **Вход** | **Изход** |
| word.I,world?best,C#;C# nica:nicer?I.C#:nicer Hello,ala,Hello nice-is!nicer-C#-the-better is!this:nica!Text;ala-Text better,nicer;I?bala.world is!bala-TEXT!Text: | best -> 1  nice -> 1  the -> 1  this -> 1  word -> 1  ala -> 2  bala -> 2  better -> 2  hello -> 2  nica -> 2  world -> 2  i -> 3  is -> 3  c# -> 4  nicer -> 4  text -> 4 |
| **Вход** | **Изход** |
| am,even;better;TEXT.nice!Hello  the,best;am-nica,this-Hello  world-best.world?nica.nicer-bala  the!nicer?word,even-ala:nicer?nica  world:even,C#:nicer,nica  even!best?I,C#?ala-I!nice.even  is-nice!is-TEXT.world;nicer;best  nica?I,bala:C#!word!world?better  Text:am.word?ala.Hello.best:nice  Hello-Hello:I:ala!bala:Text-C#;the  this?world.bala!I-Text,this?world  bala:I;Hello-Hello?ala.am-Hello.C#  nicer.Hello?I- | better -> 2  is -> 2  the -> 3  this -> 3  word -> 3  am -> 4  nice -> 4  ala -> 5  bala -> 5  best -> 5  c# -> 5  even -> 5  nica -> 5  text -> 5  nicer -> 6  i -> 7  world -> 7  hello -> 9 |
| **Вход** | **Изход** |
| nica:even-best-world-nica  is,am?this;is.am-is!am  the-this!nica-TEXT-ala.  am;nicer,nice.  this-nice?ala;C#-I  word,  world:world.nice,  TEXT!even;ala  am:bala;better  the:  nicer;nicer:  Text-nice:ala.ala-am-  better;the;the;I!nice,C#  ?am?Hello?Hello!ala  world!  I  ala:Hello!even:Hello!  bala?nicer:nice-bala.nice!  ala?Text;TEXT  best.I-nica  I  better  is:  C#  nica-is.is-best  ala.better?  TEXT;even-better:nica:am.nice  -even-I?even?nice;nica?  even  nica  best,ala,word; | word -> 2  bala -> 3  c# -> 3  this -> 3  best -> 4  hello -> 4  nicer -> 4  the -> 4  world -> 4  better -> 5  i -> 6  is -> 6  text -> 6  even -> 7  am -> 8  nica -> 8  nice -> 9  ala -> 10 |
| **Вход** | **Изход** |
| nica.best-better:TEXT;  ala.C#-I;C#!TEXT:nice,word;  ala!nice,Text;bala;the-better  ;nica,word:C#,nica:this,bala  ,am!word;ala-bala;Text:word,  nice;Text  ;this.Hello!world-is,nice?TEXT  :the?nica,the:C#.TEXT:nice;nica  -Hello;better.best:am:ala,is,  nicer;word-ala.the;nicer:word.  nica,this!word,better?am-even!  TEXT-better?nice.better,this?  I:ala,Hello.better:this,Text:  Text!best!nica!word?Text: | even -> 1  world -> 1  i -> 2  is -> 2  nicer -> 2  am -> 3  bala -> 3  best -> 3  hello -> 3  c# -> 4  the -> 4  this -> 5  ala -> 6  nice -> 6  better -> 7  nica -> 7  word -> 8  text -> 11 |
| **Вход** | **Изход** |
| am.ala-TEXT!nica.nica!  better.is?this!TEXT;world  .world:Text;TEXT!world:I!  Text!best;TEXT:TEXT,the;is.  Hello,better!ala,I.ala!  better.nice.nica.best.  nice:this-even?word!  this,is-nicer?I,ala-  am.am.better:best.Text;  ala!TEXT!ala:bala,am.word  !nice,nice?even?Text,this;  word!this;is.I!C#.is?the;  better;C#,nicer?nica?I!  nicer?even!I-bala-bala.  this.world.best?Text!bala  !Hello?nica!ala,is,word;  Hello;C#;ala?nice?nica!  TEXT.nicer:nica:Text?nica  !nice-nicer?Hello?nicer?  best?nicer!am.best!nica?  word-C#.better,nicer-C#;  I;I;best:bala-best.C#-bala  ?am.TEXT.Hello-this-TEXT.  this!even-this:nica-nice!  the.the!ala.word?the?nicer-  C#.is.I.even!nica;TEXT.Text,  better!even:C#!is,am:Hello.  TEXT,the?word:better.even.  nicer,better?is;am.bala:better! | world -> 4  hello -> 6  the -> 6  bala -> 7  even -> 7  nice -> 7  word -> 7  am -> 8  best -> 8  c# -> 8  ala -> 9  i -> 9  is -> 9  this -> 9  better -> 10  nicer -> 10  nica -> 11  text -> 18 |
| **Вход** | **Изход** |
| the:this;even,ala,even,  ala?nice!TEXT?bala,this!  the?I-ala-ala:this:  the!nica-the-better.ala  ?ala.is!word?TEXT,am-I!  better;am,nicer.nice:ala  :is-bala,even.best,ala;  nica;the;TEXT!I-am,nicer.  even,C#:word?this:better:  I:better.am-nica!bala?nica,  better,better-I?this:nicer!  I-this,the-bala-nice;the;am.  I!ala;bala,best!C#;word-even  ,best?best.better?even:am?word  ?I!nica:C#,nica.Hello!better!  world;ala!ala!even?is,C#!nice  ;am,even-bala-TEXT-Text,I;Hello  -ala.nice,the,best,I?is!nica;TEXT  ?even-the:Text,nicer-I;nice-Hello  !ala.world:better-Hello-best:nicer  ?Text?even,ala;best:world;better!  ala!even.Text.this?nicer!better  -nice;I,TEXT:Text.the:am?Hello  ?nice!C#!is:is:Hello?this,the;  bala?bala.bala:this.am!C#?word  .best:ala!the:nicer;nice;word  .nicer,Text!is-nice;word,word  :better!TEXT.ala.I?bala-is!  better;bala:best:Text.best;  I.bala!word!Text?bala!C#:nica  !C#.is.am;TEXT:is.Text!nica  ,nice?am!is,C#!Text,the!this  .nica;nicer-is-TEXT;the!  this.Hello.am?nicer:better  ,nica-best-best,I.nica:word  !nica!word!nicer!word,I!best  !Hello-nice?best:Hello:nica  .C#!even:word:word!Hello:is:  Text:ala!bala?nica?TEXT-TEXT  ,better?this!word;best!am?better  :C#-nice!nicer?is:world!best,I!  Hello?word.bala,nicer;nicer:  best.nicer?this;nicer:better  ;I?nica-bala:nice?nice?I.C#.  Text-nice:even?better:is,  the-C#?best?Text:word-C#;  nice,TEXT;world!bala?better  ;C#.is-ala-better,I.Text,  word?Text!better?is.ala!  nica;nice:C#,word!Hello?  TEXT.bala!C#?better,even  .world!word:better:word:  bala-Text:is-nica!nicer:  ala;nicer!I:better!better.  nicer,bala:is;is-TEXT,better?  better?I-Hello!better!better.  bala-ala,nicer:ala?I?even!am,  nica?am?nicer!nice;better.the  !bala;bala!Text!nice.the!  this:ala,Text:Text!ala?the?  nica?best!C#!even:Hello?bala  ?Hello:even!is?word:nica-C#  .I;nicer,world?TEXT-best.this  .am.nicer?nicer:Hello?Hello-nice  ?better-Hello-world:nicer?is;  nica;Text;nica;Hello!I,best.  bala-nica;am;I.the:best!word  ,word,better:even;I-C#,is,word  ?word:Hello:I.Text-bala?is!ala  ,better;nice.TEXT,word.nica.world  .nice?bala,bala?word,ala.bala:  ala!am-ala!best?nicer;this;  Hello-even.world!world-bala:  I.bala!even?nice!nica.is-word  .nica-world-word;even!word:  nice!nica,even,ala!world:C#  :bala,Text-nica?is,bala.I.  C#-nice-I.I!ala; | world -> 13  this -> 16  am -> 18  the -> 19  hello -> 21  c# -> 22  even -> 22  best -> 23  is -> 26  nice -> 26  nicer -> 26  nica -> 29  ala -> 31  word -> 31  i -> 32  bala -> 33  better -> 33  text -> 38 |
| **Вход** | **Изход** |
| TEXT:ala!this,is!word  ;Hello?nica;Hello;nice?  bala!better?the!Hello?  even;even;TEXT,TEXT;I;best  :TEXT.Text;nica.best-am!this  ,am;best;TEXT:nicer,this?  word!nica;TEXT.this:I?  nicer,is;better-nicer:best  -am?nica?I;C#;world.bala!  ala:bala.Hello:nica;even.  bala?word?ala.am,am-bala.  am:I.am;C#!bala:nicer?ala,  is:even-word.this:even.worl  d!nicer!better.Hello!I?nic  er:this,nice:this!word:bala  :better!better.world;I?I.I:  best!the.bala?nica?the.wor  ld!best;nice?I;nica-Text?T  ext;nica.am?bala,the-bet  ter,bala?nice-better;Hel  lo.nicer:nice?Hello?bala,  the-TEXT;Text-nicer-C#?am  .even!word,Text!is!C#;I:b  etter!C#?bala.the,even,ni  ca?best,I!bala.ala,even,n  ice?nica:is:Text-am.word?  am-best!nica!I?nicer;bett  er;nica-nica;better?nice  r?am;word:nice;better.am  :C#?Hello-C#:the-Text,Te  xt!Hello!ala:word.word;wo  rld,nicer:am-the:word:bal  a.best-this!nica?the;even  ;nice:is!Text.world,Text.ba  la-bala,nica!world!is.I;  ala?the-world,world:Hello  ?am?Hello-best!best:nica.  TEXT?word;bala.better-Hel  lo!bala.I!Hello?bala!ala.  nicer?the.world.nicer!the  :ala,TEXT:Hello.Hello-Text,  TEXT,bala:nicer:the;even-I,  this?nicer:I,TEXT?even?word  !the,ala.Hello-Text!better,  ala:even.even?world,TEXT;ev  en,is:am!this:the:TEXT:bett  er,nice;this;nica:best!Text  :better,I.TEXT:world;is?C#!  Hello:Hello:nicer?best.even  :better:I,word?the?nicer?be  tter,even?nica,nica:bala;th  e,best;C#!nica;am-the!bette  r-world-nice-nica;nicer?bal  a.nica.am?word;nicer:C#!nic  e;nice,I.nice-am:am  ?TEXT:word!Hello!TEXT:ala,  best;is?bala.TEXT-is.better?nicer? | b -> 1  ba -> 1  be -> 1  bet -> 1  bette -> 1  ca -> 1  d -> 1  en -> 1  etter -> 1  ev -> 1  ext -> 1  ice -> 1  la -> 1  ld -> 1  n -> 1  ni -> 1  rld -> 1  t -> 1  te -> 1  ter -> 1  th -> 1  tter -> 1  wo -> 1  wor -> 1  worl -> 1  xt -> 1  a -> 2  bal -> 2  bett -> 2  e -> 2  hel -> 2  lo -> 2  nic -> 2  r -> 2  er -> 3  c# -> 10  world -> 10  is -> 11  this -> 11  ala -> 12  nice -> 12  better -> 13  best -> 15  even -> 15  word -> 16  hello -> 17  the -> 17  nicer -> 18  i -> 19  am -> 20  bala -> 20  nica -> 21  text -> 28 |
| **Вход** | **Изход** |
| nicer;better;bala:am!  this,I-the,Text?nicer  !C#;even!bala!Text:TEX  T,nica?Text;world.I-the  ?Hello-better;word,world  !word,nicer-Text!the.ala  ?nice!world:C#?even;I-am  ;word,the?Hello!the,is!H  ello-C#-Hello!nice.bette  r,TEXT,nice,Hello!bala,a  m;word-bala?even;Text:He  llo!word!C#;world,word!T  EXT?bala:Hello?word-Hell  o?word:I!TEXT!nice-Text:  is?even,I?even.the!nicer  .is-better,is!I-world:C#.  nica!C#:nice-bala-the!wor  ld.bala!nicer;bala!world:  Text!ala;C#-word?Hello!ba  la,even.best!is-I;am:Hell  o;even.ala;Text,C#:bala;C  #,the:Text.the.better!I.ev  en?best?bala?bala?nicer?is  .best?C#?this.better;ala,n  ica?ala,ala.better:even:the  .nice-nice:ala.world.best:  is;is.Text,I.C#-TEXT;nice-  even,I?best,ala,world:Text  !C#,TEXT.C#;bala;TEXT.is  ;nica;even.TEXT;nica!ni  cer:better,is;word?world  :C#,C#.best?nica?ala;nic  e!am.Hello-nice.Hello;b  etter?world-Text?Text.a  m:word-TEXT?Text:world?  nicer!C#:nicer:word?  world;even:nice!bala-is  ?the:Text.nicer,ala!I?e  ven:is-ala?the:C#?bette  r:Hello.I;bala?  TEXT!bala:Hello;nice-  C#:world?ala:best?bala.  ala!is,ala-  is!is!Hello?TEXT-am-nic  a!Hello;world,Hello-Hel  lo:TEXT-  is-C#!even!the:Text,nic  a-is!is!I;nice.am!the!a  m;the.even-this.TEXT,ni  ce;ala-Text:nicer?the.a  la-ala.even-  nice?world,word;TEXT-bal  a,bala;I,is?the:TEXT!I;w  orld-even,best;the;nice:  nice:is;best-even!word?b  ala,world,bala?I.TEXT:ba  la?Hello!Hello-word.even?  TEXT:this:ala.this!better  ;even.this,nice-I;best,be  tter;word,Hello?ala;Text?t  he.Text;this;nicer?ala;wo  rd!is;I?TEXT.word-world;w  orld:the;bala.nica-word!n  ice,even.bala!this!nicer!  nice-better!ala?TEXT;Hell  o;Text,word-best;even?thi  s-even?  I,nicer.nica:better;nice:  even:world.C#;this.TEXT?a  m-nice:am?ala,even!is!C#?  the;nica-nica-ala;am?I.ba  la-Text-am,nica-TEXT:this  ,this.Hello?best;ala?TEXT  :this;is.Text,better-worl  d?even.better?I:ala.bette  r!this.nica,nicer?I.nicer  -even,C#:even;nice:am,thi  s,bala;Hello,is;am:even;a  la.ala,Hello:even.TEXT:th  is-nica;Text-ala-the:this  ?Hello.TEXT:nice:TEXT,Hel  lo-Hello,best?this;nica,a  m:better,nice?this?I.nice  r;is-bala.am;I!the,nica-a  la-better,even.better:bal  a?nice,best:better:best?e  ven!this?even-ala;best?be  tter-nica?TEXT;ala.bala:a  la.is-nice;nice,TEXT.am.a  la,world-even-nice:best,H  ello!nicer!even!better.wo  rld:word:I.world-C#!nicer  even:is!best;is;ala?Text!a  la.ala:TEXT,better.ala;am!n  icer!the.better;is;this;eve  n?the?word?even:best!better  :is;word;better-word:better  ,nicer;word,even-the.C#;wor  ld.nicer-nice:even,even:nic  er!C#-TEXT.best,am-Text,am;  C#.this-ala:is;even,ala-the  ,ala.is.better-this;Hello,I  .TEXT?is!world.is,bala-best  :ala-best,TEXT,C#-Hello?nic  a:better!Text;nica:the.worl  d;C#?ala?better;nice?bala?w  ord,TEXT:C#.world.am;the:ni  cer!C#:C#!the:word:bala.bal  a-ala:TEXT;is;better.C#?nic  er;this?nica:this?even;bala  ,nice.Hello?the:world?the!t  his!world!nica.nica.even.be  tter:better:world-Hello?ala  .even.nica!am!nica?even-be  st:I?C#:word-world-  TEXT-is!word;bala;even:C#-  am.ala-C#.nice.word.nicer!  word!am-world?better.word.  nicer;world,world,C#.even-  nice,nice!C#-bala-better;H  ello!this;nicer:I!C#!I!I:b  etter.better,best;Text!nic  er.word.TEXT!ala-better:is  ?am;C#?this!Text.Text?Hell  o?C#,nica?this,TEXT-word:w  ord,TEXT.C#!am,nica-word,e  ven,C#!is,word!even!ala;ni  ca-better-nicer?Text.world  .word,this,even.Hello-  I.I:bala;Text,bala;world.a  la!nicer.better,Hello:TEXT  ,this:Text!nica,I?nice,TEX  T,is,this!best?am?Text?I-n  ica:Hello!word:nica,best?a  m.Text-is-  nica;is;better;even,better  ;nice?world,best-bala?C#-  TEXT;this!I:bala,ala?bala:  word:this.ala-is-Hello!nic  e.best!word!best;Hello;Tex  t.word!ala!am-the;nicer?ev  en!I:better;even,nicer.TEX  T.bala-the!C#-nica.word.Te  xt!C#;word-word.TEXT?C#?ni  cer!bala!nica-ala:ala?nica  !better!the!ala?is.this.ev  en!TEXT,word:even.nica:Tex  t.this!the.ala!TEXT!world:  I-am:TEXT:word:TEXT?TEXT.T  EXT-is,the:better?nicer;ni  cer:world!best?even;ala;th  e-ala,TEXT!Text-best;C#.al  a-nicer;better!best?nica;b  etter-nice.bala.Hello;I;be  tter;Hello!C#:better!  world-TEXT.best?even-this-  this!Hello!am!I.better;nic  e.better;this-Text!nice;am  ;even.best!  this.nica!nica-nicer.TEXT!  nicer,Hello;I?this?nice!wo  rld?nica,the!the;better?  bala.I.best:Hello!even!Hel  lo.word?is-best-I;C#,best-  word!nicer:Text;even?Hello  ;even-am.the!world-world!i  s:word!C#:nica,better:ala,  word;best,am!nicer,Text;be  st?nica.word;word!TEXT!nic  e,nice?nice?world?Hello;ba  la!is;am-word!ala:nice.eve  n!is;better?nica:even!C#,w  orld.bala-world,Hello?nice  r:is,C#:this,word.am?TEXT.  TEXT;TEXT,best:nicer,best-  even:Text:bala-is!ala?nice  r-Hello:world-word!bala.al  a.I,best:am.C#!  Text!ala-am!better:even,C#  ?nice;Text;the;C#.nicer-is  ;TEXT-better,is,nicer,C#;  ala.the!Hello,nicer-world!TEXT, | # -> 1  c -> 1  ca -> 1  ce -> 1  his -> 1  ice -> 1  icer -> 1  llo -> 1  rd -> 1  te -> 1  xt -> 1  al -> 2  d -> 2  eve -> 2  ext -> 2  he -> 2  ica -> 2  ld -> 2  ord -> 2  rld -> 2  st -> 2  th -> 2  thi -> 2  wor -> 2  worl -> 2  bal -> 3  bette -> 3  ello -> 3  en -> 3  er -> 3  etter -> 3  ev -> 3  h -> 3  hel -> 3  lo -> 3  orld -> 3  s -> 3  ven -> 3  wo -> 3  b -> 4  ba -> 4  cer -> 4  hell -> 4  o -> 4  tter -> 4  tex -> 5  w -> 5  be -> 6  m -> 6  n -> 6  ni -> 6  r -> 6  e -> 8  t -> 9  nic -> 10  la -> 11  a -> 21  am -> 33  nicer -> 36  nica -> 37  this -> 38  best -> 40  hello -> 40  bala -> 41  the -> 41  world -> 41  i -> 44  nice -> 44  better -> 47  is -> 52  word -> 53  c# -> 55  ala -> 56  even -> 58  text -> 93 |
| Задача 4. DictHashSet | |
| **Условие**  Реализирайте структурата данни "множество" в клас DictHashSet<Т>, базиран на класа Dictionary <T, T> или на класа HashDictionary <K, V> (реализиран в Глава 18. Речници, хеш-таблици и множества от книгата Въведение в програмирането със C#), съхраняващ елементите. Имплементирайте всички стандартни операции като Add(T), Contains(T), Remove(T), Count, Clear(), обединение и сечение.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху множество от цели числа. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add m –добавя числото m в множеството. Ако m вече се съдържа в множеството, на екрана се изписва "False" на нов ред.  count – изписва на екрана съобщение "c", където c е броят елементи в множеството.  remove m – ако множеството съдържаm, то m се изтрива от него. В противен случай на екрана се изписва съобщение "False".  contains m – ако множеството съдържа m, на екрана се изписва съобщение "True". В противен случай на екрана се изписва съобщение "False".  clear – изтрива всички елементи от множеството.  union a b c… - в множеството се запазва обединението му с множеството, състоящо се от a, b, c…  intersect a b c… - в множеството се запазва сечението му с множеството, състоящо се от a, b, c…  elements – извежда всички елементи на множеството, разделени с интервал, сортирани в нарастващ ред.  Пример:  14  add 14  add 15  count  elements  remove 3  add 14  remove 14  union 1 2 3  remove 12  contains 15  intersect 2 15 17  elements  clear  count  Резултат:  2  14 15  False  False  False  True  2 15  0 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  Използвайте за ключ и стойност една и съща стойност – елементът от множеството. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  using System.Text;  class DictHashSet<T> : IEnumerable<T>  {  private Dictionary<T, T> container;  public int Count  {  get  {  return container.Count;  }  }  public DictHashSet()  {  this.container = new Dictionary<T, T>();  }  public bool Add(T element)  {  bool containsElement = this.Contains(element);  if (containsElement)  {  return false;  }  else  {  container.Add(element, element);  return true;  }  }  public bool Contains(T element)  {  T value;  if (container.TryGetValue(element, out value))  {  return true;  }  else  {  return false;  }  }  public bool Remove(T element)  {  bool isElementRemoved = container.Remove(element);  return isElementRemoved;  }  public void Clear()  {  this.container.Clear();  }  public void Union(DictHashSet<T> other)  {  if (other == null)  {  throw new ArgumentNullException();  }  foreach (var item in other)  {  this.Add(item);  }  }  public void Intersect(DictHashSet<T> otherSet)  {  if (otherSet == null)  {  throw new ArgumentNullException();  }  DictHashSet<T> intersection = new DictHashSet<T>();  foreach (var item in otherSet)  {  if (this.Contains(item))  {  intersection.Add(item);  }  }  this.container = intersection.container;  }  public IEnumerator<T> GetEnumerator()  {  foreach (var item in this.container)  {  yield return item.Key;  }  }  IEnumerator IEnumerable.GetEnumerator()  {  return this.GetEnumerator();  }  }  class CommandExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  DictHashSet<int> set = new DictHashSet<int>();  ExecuteCommands(set);  Console.WriteLine(output);  }  private static void ExecuteCommands(DictHashSet<int> set)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, set);  }  }  private static void ExecuteCommands(string command, DictHashSet<int> set)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, set);  break;  case "count":  ExecuteCountCommand(set);  break;  case "remove":  ExecuteRemoveCommand(tokens, set);  break;  case "contains":  ExecuteContainsCommand(tokens, set);  break;  case "clear":  ExecuteClearCommand(set);  break;  case "union":  ExecuteUnionCommand(tokens, set);  break;  case "intersect":  ExecuteIntersectCommand(tokens, set);  break;  case "elements":  ExecuteElementsCommand(set);  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteAddCommand(string[] tokens, DictHashSet<int> set)  {  int newElement = int.Parse(tokens[1]);  bool isCommandSuccessful = set.Add(newElement);  if (!isCommandSuccessful)  {  PrintLine(isCommandSuccessful.ToString());  }  }  private static void ExecuteCountCommand(DictHashSet<int> set)  {  int count = set.Count;  PrintLine(count.ToString());  }  private static void ExecuteRemoveCommand(string[] tokens, DictHashSet<int> set)  {  int element = int.Parse(tokens[1]);  bool isRemoved = set.Remove(element);  if (!isRemoved)  {  PrintLine(isRemoved.ToString());  }  }  private static void ExecuteContainsCommand(string[] tokens, DictHashSet<int> set)  {  int element = int.Parse(tokens[1]);  bool contains = set.Contains(element);  PrintLine(contains.ToString());  }  private static void ExecuteClearCommand(DictHashSet<int> set)  {  set.Clear();  }  private static void ExecuteUnionCommand(string[] tokens, DictHashSet<int> set)  {  DictHashSet<int> unionSet = new DictHashSet<int>();  for (int i = 1; i < tokens.Length; i++)  {  int otherSetElement = int.Parse(tokens[i]);  unionSet.Add(otherSetElement);  }  set.Union(unionSet);  }  private static void ExecuteIntersectCommand(string[] tokens, DictHashSet<int> set)  {  DictHashSet<int> intersectionSet = new DictHashSet<int>();  for (int i = 1; i < tokens.Length; i++)  {  int otherSetElement = int.Parse(tokens[i]);  intersectionSet.Add(otherSetElement);  }  set.Intersect(intersectionSet);  }  private static void ExecuteElementsCommand(DictHashSet<int> set)  {  SortedSet<int> sortedSet = new SortedSet<int>();  foreach (var item in set)  {  sortedSet.Add(item);  }  StringBuilder buffer = new StringBuilder();  foreach (var item in sortedSet)  {  buffer.AppendFormat("{0} ", item);  }  PrintLine(buffer.ToString());  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 14  add 14  add 15  count  elements  remove 3  add 14  remove 14  union 1 2 3  remove 12  contains 15  intersect 2 15 17  elements  clear  count | 2  14 15  False  False  False  True  2 15  0 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 105  add 77  add 90  add 59  add 83  add 53  add 53  add 17  add 42  add 11  add 94  add 79  add 84  add 28  add 97  add 29  add 94  add 93  add 83  add 53  add 21  add 68  add 30  add 75  add 47  add 14  add 95  add 46  add 79  add 46  add 65  add 30  add 49  add 66  add 77  add 25  add 93  add 37  add 29  add 64  add 75  add 34  add 94  add 46  add 27  add 63  add 56  add 52  add 29  add 95  add 86  add 65  add 96  add 52  add 92  add 96  add 38  add 72  add 63  add 90  add 75  add 72  add 20  add 93  add 49  add 33  add 48  add 55  add 29  add 89  add 40  add 83  add 80  add 61  add 42  add 70  add 93  add 42  add 24  add 62  add 71  add 62  add 70  add 97  add 58  add 60  add 55  add 36  add 17  add 30  add 73  add 55  add 43  add 52  add 23  add 75  add 98  add 67  add 82  add 63  add 30  add 92  add 22  add 39  add 12  count | False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  63 |
| **Вход** | **Изход** |
| 68  elements  contains 432  contains 721  remove 912  clear  remove 627  union 4 18 10 9 9 19 10 18 18  intersect 3  clear  union 8 3 19 2 6 16 8  union 11 14 1 5 10 16  intersect 0 4 3  union 15 8 8 4  add 792  union 4 5 15 19 13 12  intersect 16 15 11 4 11 18 8  add 316  union 5  intersect 15 8 8 4  clear  elements  remove 691  add 48  elements  clear  elements  intersect 19 19 8 17 11 6 1 15 8  clear  count  elements  intersect 13 17 3  elements  add 811  count  remove 899  contains 657  add 190  count  clear  count  remove 19  count  elements  remove 104  intersect 17 4 8 11 7 0 1  elements  remove 728  clear  count  union 11 16 9 11 13 4 19  elements  count  elements  intersect 18  add 326  clear  clear  union 5 2  clear  contains 714  union 18 19  elements  remove 413  clear  intersect 6 16 0 12 12 2  clear  intersect 9 9 9 2 19 10  add 379 | False  False  False  False  False  48  0  1  False  False  2  0  False  0  False  False  0  4 9 11 13 16 19  6  4 9 11 13 16 19  False  18 19  False |
| **Вход** | **Изход** |
| 513  intersect 11 14 1 5 10 16  remove 762  clear  add 866  intersect 6 16 0 12 12 2  elements  remove 779  union 15 3  add 26  union 6 3 2 12 0 5 9 9 13  add 246  add 992  remove 277  contains 481  clear  add 59  elements  remove 379  count  add 581  count  count  add 378  intersect 12 14 19 15  elements  count  union 13 14  clear  union 5 2  contains 819  contains 128  remove 436  contains 821  add 75  remove 22  contains 795  intersect 15 5 1  clear  elements  union 18 1 18 14  remove 897  intersect 16  union 3 4 17 9 8 2 19 1  elements  count  intersect 17 4 8 11 7 0 1  add 884  intersect 19 6 13 7 15 18  union 11 16 9 11 13 4 19  clear  count  add 704  union 16 3 11 1 2 10 1 5 18  count  count  intersect 1  remove 512  count  contains 111  remove 913  elements  elements  contains 998  intersect 19 6 13 7 15 18  add 497  remove 978  contains 3  contains 183  add 114  clear  count  remove 874  elements  add 513  intersect 1 19 5 7 17 16 1  intersect 19 6 13 7 15 18  elements  contains 976  contains 547  intersect 5 11 5 0  elements  contains 188  count  union 3  elements  count  remove 781  union 6 3 2 12 0 5 9 9 13  remove 172  count  contains 617  remove 790  contains 980  intersect 8 16  union 12 14 19 15  add 2  count  add 281  clear  elements  count  contains 265  union 16 1 3 14 19 2 11 7  remove 518  contains 963  union 18 1 18 14  union 11 19 16 18 16 11 9 14  clear  contains 212  union 8 3 19 2 6 16 8  remove 93  intersect 18 8 3 4 12 15 19 16 14  elements  add 993  contains 934  clear  intersect 4 15 2 3 7 12 1 0  count  add 182  intersect 6 11  elements  elements  clear  contains 320  intersect 12 14 19 15  contains 254  add 705  union 10 9 7 12  clear  intersect 18 6 16 17 10 8 10 18  add 921  clear  count  elements  contains 175  union 6 18 7 19 15 10 10  remove 919  union 11 16 9 11 13 4 19  clear  union 19 4 5 0 12  count  union 19 4 5 0 12  remove 145  clear  add 326  contains 837  union 11 5 9 9 4 16 12 2 8  remove 788  count  elements  add 251  add 168  union 15 5 1  elements  contains 731  intersect 16 15 11 4 11 18 8  elements  intersect 11 10  count  union 12 12 11  count  contains 52  add 484  remove 484  elements  count  union 9 1 9 5  union 7 0 12 15 3 8  contains 680  count  elements  clear  elements  contains 463  intersect 4 18 10 9 9 19 10 18 18  union 4 5 15 19 13 12  clear  remove 553  add 478  intersect 2 0 3 16 2  add 506  count  remove 141  elements  clear  elements  clear  remove 499  add 851  union 7 16 17 2  contains 323  intersect 10 7 19  add 264  count  add 282  intersect 18 8 3 4 12 15 19 16 14  elements  elements  add 930  intersect 1 19 5 7 17 16 1  intersect 9 14 4 15 5 6 10 3  union 15 5 1  remove 313  add 15  add 65  elements  count  remove 557  elements  clear  add 797  count  remove 568  intersect 4 2 7 13  elements  contains 849  clear  intersect 8 3 19 2 6 16 8  union 15 3  union 18 6 16 17 10 8 10 18  intersect 12 17 6 1 18  remove 982  intersect 19 8 0 13 18 6 19  add 760  elements  elements  count  remove 835  elements  remove 419  contains 877  remove 700  clear  count  add 175  intersect 7 0 12 15 3 8  contains 806  count  elements  contains 210  count  union 10 12 14 18 7  contains 542  clear  count  clear  count  clear  union 5 13 12 6 9  count  clear  union 7 9 12 12 14 0 12 12  count  contains 620  intersect 2 0 3 16 2  elements  elements  union 13 17 3  count  count  union 5 13 12 6 9  count  clear  elements  clear  elements  add 142  remove 879  elements  elements  union 15 5 1  contains 970  contains 294  add 174  clear  contains 599  intersect 13  union 14 8 11 14 17 4  count  union 4 13 15 16 4 4 11  contains 369  remove 521  intersect 2 9 15  elements  intersect 17 10 13  count  clear  clear  clear  remove 534  union 17 13 1 7  elements  clear  add 210  union 6 3 2 12 0 5 9 9 13  add 126  remove 603  intersect 1 2 13 13 0 4 10 8 8  elements  remove 872  contains 429  contains 507  clear  count  elements  contains 999  union 5 5 12 9  elements  union 2 9 15  intersect 14 12 6 7 3 0 19 6  count  union 10 12 14 18 7  union 13 7 14 5 12 14 1 15  union 1 19 5 7 17 16 1  union 17 10 13  remove 394  contains 414  count  count  remove 771  union 3 7 5 16 11 9 9 19 4  count  intersect 8 3 19 2 6 16 8  count  elements  add 40  add 527  union 5 2  remove 109  contains 331  clear  elements  remove 658  count  union 4 15 2 3 7 12 1 0  intersect 8 18 2  remove 778  contains 47  intersect 8 16  union 12 17 6 1 18  add 931  union 14 10 18 1 0 12 10  count  contains 672  union 9 12 17 9 2 18 1  union 10  elements  add 919  remove 990  add 660  remove 984  add 485  remove 441  elements  intersect 18 19  add 561  elements  count  add 967  add 343  count  intersect 18 19  remove 430  union 13 3 16 1  contains 35  clear  elements  count  remove 492  contains 965  count  add 740  add 537  clear  remove 469  contains 563  clear  count  union 3 0 0  add 976  elements  clear  add 220  count  remove 929  remove 155  add 322  intersect 5 5 12 9  clear  clear  union 15 15 13 14 5 7 9 4 19  add 54  add 226  add 806  clear  clear  contains 845  intersect 6 3 2 12 0 5 9 9 13  intersect 19 19 8 17 11 6 1 15 8  clear  contains 938  remove 783  contains 236  intersect 19 19 8 17 11 6 1 15 8  count  contains 864  clear  remove 377  contains 945  add 921  add 657  contains 49  intersect 1 17 18 0 14 8  intersect 9 14 4 15 5 6 10 3  union 2 17 15 10  clear  add 193  remove 217  intersect 13  add 205  intersect 17 10 13  intersect 3 4 17 9 8 2 19 1  remove 878  intersect 13 14  remove 354  count  add 900  intersect 7 0 12 15 3 8  intersect 12 17 6 1 18  add 446  count  contains 14  elements  clear  add 285  add 232  clear  remove 472  add 293  union 14 12 6 7 3 0 19 6  union 10  contains 175  count  elements  union 3 0 0  count  clear  intersect 8  count  elements  clear  add 669  elements  elements  intersect 4 15 2 3 7 12 1 0  remove 332  count  elements  intersect 4 18 10 9 9 19 10 18 18  union 19 17 0 10 9 18 12 17  elements  count  union 10  clear  clear  clear  union 2 15 8  remove 238  intersect 1 2 13 13 0 4 10 8 8  union 5 11 5 0  count  union 15 3  count  elements  count  intersect 17 13 1 7  remove 979  clear  remove 833  count  count  remove 382  elements  clear  remove 418  add 448  union 12 12 11  elements  remove 736  union 1 19 5 7 17 16 1  elements  count  union 1  add 299  elements  remove 700  union 3 7 5 16 11 9 9 19 4  add 352  count  add 204  intersect 10 12 14 18 7  union 4 13 15 16 4 4 11  intersect 19 19 8 17 11 6 1 15 8  elements  contains 556  count  count  count  intersect 13 17 3  intersect 11 19 16 18 16 11 9 14  contains 670  add 317  union 12 12 11 | False  False  False  False  59  False  1  2  2  0  False  False  False  False  False  False  False  1 2 3 4 8 9 17 19  8  0  9  9  False  1  False  False  1  1  False  False  False  False  0  False  False  False  False  0  3  1  False  False  8  False  False  False  5  0  False  False  False  False  False  3 8 16 19  False  0  False  False  0  False  False  5  False  False  False  9  2 4 5 8 9 11 12 16 326  1 2 4 5 8 9 11 12 15 16 168 251 326  False  4 8 11 15 16  1  2  False  11 12  2  False  10  0 1 3 5 7 8 9 11 12 15  False  False  1  False  506  False  False  2  False  False  1 5 15 65  4  False  1 5 15 65  1  False  False  False  6 18 760  6 18 760  3  False  6 18 760  False  False  False  0  False  0  False  0  False  0  0  5  5  False  0  0  4  4  8  False  142  142  False  False  False  5  False  False  15  0  False  1 7 13 17  False  0 2 13  False  False  False  0  False  5 9 12  1  False  False  12  12  False  16  3  3 16 19  False  False  False  0  False  False  9  False  0 1 2 6 9 10 12 14 17 18 931  False  False  False  0 1 2 6 9 10 12 14 17 18 485 660 919 931  18 561  2  4  False  False  0  False  False  0  False  False  0  0 3 976  1  False  False  False  False  False  False  0  False  False  False  False  False  False  False  0  1  False  446  False  False  9  0 3 6 7 10 12 14 19 293  9  0  669  669  False  0  0 9 10 12 17 18 19  7  False  5  7  0 2 3 5 8 11 15  7  False  False  0  0  False  False  11 12 448  False  1 5 7 11 12 16 17 19 448  9  1 5 7 11 12 16 17 19 299 448  False  14  11 15  False  2  2  2  False |
| **Вход** | **Изход** |
| 183  count  intersect 15 15 13 14 5 7 9 4 19  intersect 17 4 8 11 7 0 1  intersect 4 13 15 16 4 4 11  count  remove 113  contains 781  union 7 9 12 12 14 0 12 12  union 9 12 17 9 2 18 1  union 3 7 5 16 11 9 9 19 4  intersect 13 3 16 1  union 13 14  remove 968  elements  clear  clear  union 7 13 9  add 166  clear  intersect 5  clear  union 13  clear  remove 698  union 11 16 9 11 13 4 19  elements  elements  count  union 7 16 17 2  add 680  clear  count  clear  union 2 9 15  count  elements  contains 134  intersect 11 19 16 18 16 11 9 14  count  count  clear  remove 946  elements  add 295  remove 15  remove 102  intersect 17 13 1 7  remove 455  count  remove 770  count  add 469  add 136  elements  clear  intersect 10 9 7 12  count  union 17 10 13  count  union 13 14  contains 485  union 11 10  add 276  union 11 16 9 11 13 4 19  intersect 3 18  remove 41  union 0 2  intersect 1 19 5 7 17 16 1  intersect 18  remove 649  elements  union 7 0 12 15 3 8  contains 445  remove 65  remove 53  union 2 17 15 10  add 396  clear  clear  intersect 2 17 15 10  clear  remove 494  contains 826  union 15 10 16 11 5  intersect 9 9 9 2 19 10  intersect 11 16 9 11 13 4 19  elements  clear  elements  add 874  add 209  intersect 0 6 10 16  remove 194  union 19 8 0 13 18 6 19  contains 183  add 897  count  union 12 17 6 1 18  add 998  elements  count  intersect 1 17 18 0 14 8  count  count  add 851  clear  clear  contains 833  remove 507  intersect 3 18  count  remove 402  intersect 18 6 16 17 10 8 10 18  contains 402  clear  remove 37  union 16  contains 662  count  union 1 6  elements  clear  union 5 2  add 880  add 694  contains 750  clear  count  contains 131  union 14 12 6 7 3 0 19 6  count  add 304  union 19 8 0 13 18 6 19  clear  contains 751  remove 586  count  clear  contains 401  intersect 11 14 1 5 10 16  intersect 11 10  remove 891  add 438  count  contains 363  count  add 726  intersect 5  elements  elements  elements  remove 221  union 18 19  elements  elements  contains 162  elements  elements  contains 742  clear  count  add 877  count  contains 731  intersect 14 5 4 8 14  count  intersect 3  intersect 13  add 471  union 2 15 8  elements  union 11 16 9 11 13 4 19  clear  count  count  count  clear  intersect 9 12 17 9 2 18 1  intersect 18 1 18 14  count  contains 765  union 15 3  elements | 0  0  False  False  False  1 3 13 14 16  False  4 9 11 13 16 19  4 9 11 13 16 19  6  0  3  2 9 15  False  1  1  False  False  False  False  0  False  0  136 469  0  3  False  False  False  False  False  False  False  False  False  False  7  0 1 6 8 12 13 17 18 19 897 998  11  5  5  False  False  0  False  False  False  False  1  1 6 16  False  0  False  7  False  False  0  False  False  1  False  1  False  18 19  18 19  False  18 19  18 19  False  0  1  False  0  2 8 15 471  0  0  0  0  False  3 15 |
| **Вход** | **Изход** |
| 173  count  count  contains 101  union 19 4 5 0 12  remove 107  union 3 18  count  elements  count  count  remove 131  contains 443  count  add 800  add 463  clear  intersect 8 11 19 19 16 8 1 10 13  intersect 18  clear  union 4 2 7 13  add 71  contains 370  contains 87  union 17 13 1 7  clear  intersect 11 5 9 9 4 16 12 2 8  contains 264  remove 889  elements  remove 120  remove 202  elements  elements  remove 929  count  union 2 15 8  remove 874  union 7 0 12 15 3 8  clear  add 341  add 891  union 8 11 19 19 16 8 1 10 13  elements  add 761  remove 593  remove 817  clear  count  remove 894  intersect 18 6 16 17 10 8 10 18  add 247  clear  contains 175  union 4 18 10 9 9 19 10 18 18  count  union 4 5 15 19 13 12  remove 202  intersect 17 4 8 11 7 0 1  contains 346  elements  count  elements  count  clear  count  count  contains 546  remove 82  add 609  clear  union 2 2 10 3 5 14 10  add 235  count  remove 534  elements  elements  count  count  union 18  elements  contains 162  intersect 8  contains 278  remove 57  elements  clear  elements  intersect 2 9 15  add 870  intersect 11 10  contains 528  count  contains 934  count  clear  contains 65  intersect 17 19 13 18 1  remove 836  add 935  add 346  add 383  clear  contains 694  remove 265  clear  clear  contains 329  contains 320  contains 54  add 512  union 0 9 18 3 3  elements  contains 470  add 170  count  remove 466  remove 776  add 530  elements  union 3 18  add 487  remove 172  intersect 7 0 12 15 3 8  elements  intersect 11 14 1 5 10 16  union 8 18 2  add 744  remove 943  count  remove 324  intersect 12 17 6 1 18  elements  clear  remove 387  remove 342  intersect 11 5 9 9 4 16 12 2 8  intersect 6 18 7 19 15 10 10  elements  remove 704  union 14 10 18 1 0 12 10  clear  intersect 10 16 12 2 7 13 19 1 8  elements  elements  add 539  add 398  elements  add 607  count  remove 560  union 13 14  count  clear  union 6 18 7 19 15 10 10  count  elements  intersect 16 8  remove 932  add 946  union 4 13 15 16 4 4 11  contains 92  elements  contains 447  elements  remove 908  add 402  clear  elements  contains 307  union 4 15 2 3 7 12 1 0  union 0 6 10 16  union 16 3 11 1 2 10 1 5 18  count | 0  0  False  False  7  0 3 4 5 12 18 19  7  7  False  False  7  False  False  False  False  False  False  False  0  False  1 8 10 11 13 16 19 341 891  False  False  0  False  False  5  False  False  4  1  4  1  0  0  False  False  6  False  2 3 5 10 14 235  2 3 5 10 14 235  6  6  2 3 5 10 14 18 235  False  False  False  False  0  False  0  False  False  False  False  False  False  False  0 3 9 18 512  False  6  False  False  0 3 9 18 170 512 530  False  0 3  False  4  False  18  False  False  False  398 539  3  False  5  6  6 7 10 15 18 19  False  False  4 11 13 15 16 946  False  4 11 13 15 16 946  False  False  14 |
| **Вход** | **Изход** |
| 126  intersect 1 2 13 13 0 4 10 8 8  add 954  count  count  elements  contains 787  add 49  contains 569  union 17 4 8 11 7 0 1  remove 319  add 231  contains 422  clear  elements  clear  remove 185  contains 747  intersect 11 5 9 9 4 16 12 2 8  remove 303  clear  add 527  remove 30  intersect 11 16 9 11 13 4 19  remove 483  intersect 3 4 17 9 8 2 19 1  add 703  union 8 11 19 19 16 8 1 10 13  clear  clear  count  count  union 0 9 18 3 3  union 9 9 9 2 19 10  count  union 13 10 1 11 14 2 10 13 3  clear  add 814  count  union 5 13 12 6 9  union 10 9 7 12  elements  contains 197  remove 295  contains 874  elements  elements  clear  remove 789  intersect 2 0 3 16 2  contains 814  count  clear  intersect 9 12 17 9 2 18 1  count  intersect 8 18 2  remove 718  contains 240  count  contains 280  add 456  contains 957  intersect 18 8 3 4 12 15 19 16 14  contains 292  elements  union 2 17 15 10  count  union 0 6 10 16  intersect 9 9 9 2 19 10  union 8 3 19 2 6 16 8  union 17 19 13 18 1  add 166  add 54  clear  add 188  intersect 16  intersect 5 2  union 7 16 17 2  union 8 16  elements  contains 886  union 9 1 9 5  contains 862  union 5 5 12 9  elements  add 163  elements  clear  intersect 14 5 4 8 14  count  clear  contains 232  elements  contains 320  contains 810  count  clear  union 17 13 1 7  clear  add 592  elements  intersect 4 13 15 16 4 4 11  contains 814  remove 558  clear  count  contains 965  count  contains 869  count  remove 707  add 7  count  add 485  contains 467  add 480  elements  elements  elements  count  clear  clear  intersect 6 18 7 19 15 10 10  count  count  union 14 10 18 1 0 12 10  elements | 1  1  954  False  False  False  False  False  False  False  False  False  0  0  7  1  5 6 7 9 10 12 13 814  False  False  False  5 6 7 9 10 12 13 814  5 6 7 9 10 12 13 814  False  False  0  0  False  False  0  False  False  False  4  2 7 8 16 17  False  False  1 2 5 7 8 9 12 16 17  1 2 5 7 8 9 12 16 17 163  0  False  False  False  0  592  False  False  0  False  0  False  0  False  1  False  7 480 485  7 480 485  7 480 485  3  0  0  0 1 10 12 14 18 |
| **Вход** | **Изход** |
| 145  clear  add 262  contains 649  add 174  count  add 631  contains 433  union 18 19  add 255  count  elements  remove 87  intersect 8 11 19 19 16 8 1 10 13  add 834  elements  clear  remove 409  contains 605  count  contains 5  union 5 11 5 0  contains 43  remove 5  remove 815  add 964  intersect 12 14 19 15  elements  add 435  add 53  union 5 5 12 9  intersect 3 7 5 16 11 9 9 19 4  union 2 17 15 10  add 427  contains 32  union 2 17 15 10  intersect 18 6 16 17 10 8 10 18  contains 47  contains 934  elements  union 19 8 0 13 18 6 19  intersect 10 7 19  add 272  union 11  count  clear  elements  clear  elements  contains 323  elements  add 665  elements  add 211  remove 616  elements  elements  clear  add 227  contains 310  remove 546  count  clear  remove 842  elements  count  union 11  elements  elements  elements  elements  contains 482  intersect 19 6 13 7 15 18  clear  clear  contains 381  clear  intersect 7 13 9  remove 595  intersect 7 9 12 12 14 0 12 12  clear  count  clear  remove 895  remove 420  contains 367  add 481  add 946  add 107  count  remove 449  union 6 18 7 19 15 10 10  contains 701  union 18 1 18 14  elements  elements  elements  add 265  intersect 2 9 15  count  add 197  add 590  contains 621  elements  union 5 5 12 9  add 471  remove 24  clear  contains 375  contains 735  contains 888  elements  remove 453  intersect 19 4 5 0 12  intersect 16 8  elements  contains 380  count  clear  add 234  elements  union 4 13 15 16 4 4 11  clear  union 6 16 0 12 12 2  contains 74  contains 425  count  remove 696  remove 463  clear  union 1 2 13 13 0 4 10 8 8  remove 121  remove 742  union 11 16 9 11 13 4 19  add 644  count  add 256  union 10 7 19  elements  remove 789  clear  union 6 18 7 19 15 10 10  elements  add 815  contains 806  elements | False  2  False  6  18 19 174 255 262 631  False  19 834  False  False  0  False  False  False  False  False  False  10 17  4  False  665  False  211 665  211 665  False  False  1  False  0  11  11  11  11  False  False  False  0  False  False  False  3  False  False  1 6 7 10 14 15 18 19 107 481 946  1 6 7 10 14 15 18 19 107 481 946  1 6 7 10 14 15 18 19 107 481 946  1  False  15 197 590  False  False  False  False  False  False  0  234  False  False  5  False  False  False  False  12  0 1 2 4 7 8 9 10 11 13 16 19 256 644  False  6 7 10 15 18 19  False  6 7 10 15 18 19 815 |
| **Вход** | **Изход** |
| 22  add 234  remove 72  union 19 4 5 0 12  contains 555  remove 382  count  elements  intersect 12 12 11  add 101  union 2 15 8  contains 480  add 254  elements  count  clear  count  elements  contains 306  contains 171  elements  intersect 12 5 6 18 9 6 11  count | False  False  False  6  0 4 5 12 19 234  False  2 8 12 15 101 254  6  0  False  False  0 |
| **Вход** | **Изход** |
| 56  contains 808  contains 121  add 129  intersect 13 3 16 1  clear  add 774  intersect 11 16 9 11 13 4 19  union 19 6 13 7 15 18  remove 68  intersect 15 3  union 11 16 9 11 13 4 19  intersect 0 4 3  elements  contains 893  union 8 11 19 19 16 8 1 10 13  clear  intersect 1 17 18 0 14 8  union 13  count  remove 286  intersect 2 9 15  elements  contains 576  clear  count  intersect 7 18 4 9 0  intersect 0 9 18 3 3  contains 492  clear  add 227  elements  union 0 6 10 16  clear  remove 417  union 0 9 18 3 3  contains 90  remove 813  count  add 379  add 384  add 408  add 906  contains 132  clear  union 0 2  clear  union 8 11 19 19 16 8 1 10 13  remove 278  add 654  union 4 15 2 3 7 12 1 0  union 16 1 3 14 19 2 11 7  intersect 2 15 8  contains 334  intersect 13 17 3  contains 238  remove 612 | False  False  False  4  False  1  False  False  0  False  227  False  False  False  4  False  False  False  False  False |
| **Вход** | **Изход** |
| 118  remove 780  add 910  contains 731  contains 78  union 1 2 13 13 0 4 10 8 8  elements  elements  remove 755  union 1 19 5 7 17 16 1  contains 542  add 91  contains 567  remove 134  add 47  intersect 19 4 5 0 12  count  remove 26  contains 357  clear  union 12 12 11  contains 624  clear  clear  union 13 14  intersect 18  clear  union 11 10  clear  contains 247  remove 763  intersect 2 15 8  intersect 2 17 15 10  clear  elements  intersect 15 10 16 11 5  elements  intersect 3  contains 502  contains 535  intersect 3 7 5 16 11 9 9 19 4  count  remove 806  elements  contains 372  count  union 15 15 13 14 5 7 9 4 19  clear  contains 407  count  count  elements  add 262  union 16 8  intersect 4 13 15 16 4 4 11  elements  contains 817  count  union 9 9 9 2 19 10  remove 458  union 15 15 13 14 5 7 9 4 19  count  intersect 13 10 1 11 14 2 10 13 3  count  elements  contains 804  remove 566  clear  add 421  contains 374  elements  union 7 13 9  intersect 7 18 4 9 0  count  intersect 0 9 18 3 3  elements  count  remove 777  elements  union 15 3  clear  intersect 14 12 6 7 3 0 19 6  contains 436  remove 542  union 8 3 19 2 6 16 8  add 536  contains 366  intersect 17 10 13  elements  clear  add 442  remove 927  count  clear  add 400  remove 17  elements  remove 844  count  contains 84  contains 41  union 16 3 11 1 2 10 1 5 18  elements  elements  add 395  add 674  intersect 17 1 1 4 4 12  intersect 6 18 7 19 15 10 10  remove 744  remove 773  union 13 10 1 11 14 2 10 13 3  contains 923  contains 307  count  add 163  remove 663  remove 183  intersect 19 11 8 0 1 13 8 9  remove 917 | False  False  False  0 1 2 4 8 10 13 910  0 1 2 4 8 10 13 910  False  False  False  False  4  False  False  False  False  False  False  False  0  False  False  0  False  0  0  16  False  1  False  11  4  2 10 13 14  False  False  False  421  2  9  1  False  9  False  False  False  False  1  False  400  False  1  False  False  1 2 3 5 10 11 16 18 400  1 2 3 5 10 11 16 18 400  False  False  False  False  7  False  False  False |
| **Вход** | **Изход** |
| 119  elements  elements  intersect 19 6 13 7 15 18  elements  count  elements  elements  intersect 5  count  clear  elements  remove 796  add 432  add 635  add 223  union 6 18 7 19 15 10 10  union 8 3 19 2 6 16 8  union 2 15 8  add 772  contains 261  add 486  count  remove 176  remove 170  contains 626  add 249  clear  count  clear  count  count  union 6 3 2 12 0 5 9 9 13  contains 700  contains 519  union 5 11 5 0  remove 472  count  remove 194  remove 786  add 358  count  count  add 774  elements  clear  intersect 8 18 2  union 16 15 11 4 11 18 8  elements  elements  count  remove 196  intersect 15 8 8 4  remove 979  remove 779  intersect 13 10 1 11 14 2 10 13 3  intersect 1 6  add 703  count  intersect 19 8 0 13 18 6 19  remove 331  count  count  elements  remove 134  contains 755  clear  clear  contains 753  clear  union 17 19 13 18 1  add 132  elements  clear  union 11 5 9 9 4 16 12 2 8  intersect 16 3 11 1 2 10 1 5 18  clear  remove 624  count  clear  intersect 10 7 19  union 6 18 7 19 15 10 10  contains 654  clear  intersect 5 5 12 9  remove 829  union 17 13 1 7  clear  contains 729  remove 52  add 77  count  add 570  count  remove 537  remove 524  contains 565  union 10 9 7 12  elements  intersect 13 3 16 1  clear  elements  elements  remove 856  count  count  add 783  add 820  clear  contains 333  add 238  remove 587  count  contains 779  remove 452  count  elements  remove 60  contains 489  union 3 7 5 16 11 9 9 19 4 | 0  0  False  False  15  False  False  False  0  0  0  False  False  False  9  False  False  10  10  0 2 3 5 6 9 11 12 13 358 774  4 8 11 15 16 18  4 8 11 15 16 18  6  False  False  False  1  False  0  0  False  False  False  1 13 17 18 19 132  False  0  False  False  False  False  1  2  False  False  False  7 9 10 12 77 570  False  0  0  False  False  1  False  False  1  238  False  False |
| **Вход** | **Изход** |
| 1000  intersect 12 5 6 18 9 6 11  contains 818  intersect 16  elements  elements  add 834  union 1  count  clear  count  contains 794  clear  count  contains 658  intersect 14 8 11 14 17 4  elements  intersect 18  add 394  contains 912  union 17 4 8 11 7 0 1  clear  intersect 10 7 19  contains 484  contains 507  add 296  count  count  count  add 123  union 4 13 15 16 4 4 11  elements  contains 340  intersect 0 2  intersect 13  elements  remove 501  add 663  clear  clear  contains 104  add 84  intersect 11 14 1 5 10 16  union 2 17 15 10  elements  contains 60  count  add 507  union 11 14 1 5 10 16  intersect 9 12 17 9 2 18 1  contains 139  contains 1  clear  elements  add 726  contains 977  count  elements  contains 844  contains 752  union 13 17 3  add 966  remove 238  count  count  contains 950  union 14 10 18 1 0 12 10  intersect 1 17 18 0 14 8  count  intersect 3 18  remove 164  contains 53  contains 533  count  add 33  add 708  clear  add 6  count  union 1  intersect 1 19 5 7 17 16 1  remove 870  remove 261  elements  remove 506  clear  count  clear  elements  clear  intersect 6 0 14 5 18 17 19 11  remove 37  union 17 13 1 7  union 10 16 12 2 7 13 19 1 8  clear  elements  elements  remove 215  clear  clear  contains 943  clear  union 11 14 1 5 10 16  add 511  clear  intersect 13 17 3  elements  contains 700  elements  elements  add 483  add 506  elements  remove 683  elements  clear  union 17 4 8 11 7 0 1  contains 193  contains 965  elements  add 403  intersect 2 9 15  union 3 18  intersect 19 4 5 0 12  contains 257  union 1 2 13 13 0 4 10 8 8  add 776  clear  elements  contains 591  intersect 2 2 10 3 5 14 10  remove 709  clear  count  intersect 5 11 5 0  elements  add 755  union 18 8 3 4 12 15 19 16 14  add 827  add 857  add 883  elements  count  remove 641  clear  add 682  clear  count  elements  intersect 8 3 19 2 6 16 8  union 17 19 13 18 1  clear  clear  clear  union 10 16 12 2 7 13 19 1 8  intersect 2 0 3 16 2  count  union 9 12 17 9 2 18 1  union 19 19 8 17 11 6 1 15 8  union 2 15 8  clear  union 7 9 12 12 14 0 12 12  elements  clear  add 545  remove 480  intersect 10 9 7 12  clear  elements  union 17 4 8 11 7 0 1  add 222  add 99  union 13 7 14 5 12 14 1 15  clear  remove 333  clear  count  remove 684  clear  union 4 13 15 16 4 4 11  union 1  union 19 17 0 10 9 18 12 17  contains 18  intersect 9 14 4 15 5 6 10 3  clear  contains 244  add 763  elements  union 2 15 8  elements  clear  union 0 4 3  union 1 19 5 7 17 16 1  add 223  add 414  clear  contains 283  intersect 1 17 18 0 14 8  intersect 14 5 4 8 14  elements  add 259  count  union 7 0 12 15 3 8  elements  contains 574  clear  count  contains 428  clear  remove 801  remove 353  count  intersect 11 16 9 11 13 4 19  count  add 298  clear  elements  add 403  contains 218  union 16  contains 317  elements  elements  contains 790  remove 358  union 17 13 1 7  add 140  intersect 16 3 11 1 2 10 1 5 18  union 18 19  remove 595  elements  contains 728  elements  clear  union 16 15 11 4 11 18 8  elements  union 19 19 8 17 11 6 1 15 8  count  clear  elements  remove 839  union 5 5 12 9  add 633  contains 339  clear  add 774  count  count  count  elements  contains 768  count  count  count  intersect 17 10 13  remove 859  contains 766  remove 953  clear  count  contains 210  add 138  union 12 14 19 15  count  union 7 16 17 2  remove 861  remove 462  remove 954  intersect 19 6 13 7 15 18  contains 122  contains 858  clear  elements  contains 85  add 588  intersect 0 2  remove 382  contains 838  remove 639  clear  add 25  contains 578  remove 69  union 12 5 6 18 9 6 11  remove 593  intersect 12 5 6 18 9 6 11  elements  clear  contains 772  intersect 16 15 11 4 11 18 8  remove 901  count  union 5 5 12 9  clear  union 11 14 1 5 10 16  add 195  elements  contains 417  add 730  contains 844  remove 56  clear  count  intersect 15 3  add 160  contains 334  union 6 11  add 964  clear  clear  intersect 19 11 8 0 1 13 8 9  union 1  remove 973  intersect 1 17 18 0 14 8  intersect 17 19 13 18 1  clear  add 866  count  union 18  clear  union 2 9 15  union 0 6 10 16  intersect 15 8 8 4  add 102  clear  clear  remove 4  clear  add 230  remove 800  clear  add 993  add 508  contains 251  union 10 16 12 2 7 13 19 1 8  intersect 15 10 16 11 5  add 294  remove 667  clear  remove 325  elements  elements  remove 30  clear  union 17 10 13  intersect 16 8  clear  intersect 15 10 16 11 5  elements  remove 741  add 587  clear  count  contains 218  union 6 18 7 19 15 10 10  clear  contains 722  union 16 15 11 4 11 18 8  count  count  clear  contains 168  union 0 6 10 16  contains 471  clear  clear  remove 789  union 5 11 5 0  union 11  elements  intersect 17 13 1 7  remove 228  union 11 19 16 18 16 11 9 14  contains 885  add 319  contains 723  clear  intersect 17 19 13 18 1  count  clear  count  elements  contains 176  remove 992  remove 594  add 63  intersect 15 5 1  clear  union 4 15 2 3 7 12 1 0  intersect 12 12 11  elements  clear  union 17 19 13 18 1  clear  clear  add 282  clear  elements  elements  union 17 19 13 18 1  union 12 14 19 15  clear  add 804  intersect 11 14 1 5 10 16  intersect 13 10 1 11 14 2 10 13 3  add 991  union 1 19 5 7 17 16 1  add 546  count  clear  union 1 19 5 7 17 16 1  elements  add 905  remove 597  clear  union 1  remove 893  union 8 3 19 2 6 16 8  contains 846  add 330  clear  count  contains 849  elements  contains 659  remove 539  union 1  intersect 13 10 1 11 14 2 10 13 3  contains 83  add 297  remove 812  elements  intersect 2 15 8  elements  contains 147  contains 34  elements  intersect 5 5 12 9  clear  intersect 17 4 8 11 7 0 1  union 17 19 13 18 1  add 138  intersect 8 11 19 19 16 8 1 10 13  clear  contains 554  intersect 7 9 12 12 14 0 12 12  count  intersect 5 13 12 6 9  intersect 5 13 12 6 9  union 4 15 2 3 7 12 1 0  count  add 142  clear  clear  count  elements  union 14 10 18 1 0 12 10  remove 738  contains 487  add 571  count  elements  clear  add 872  contains 477  remove 462  remove 95  add 240  remove 656  count  add 188  remove 410  intersect 15 8 8 4  count  contains 860  count  add 330  count  union 11 19 16 18 16 11 9 14  remove 857  union 15 5 1  elements  remove 782  intersect 3 4 17 9 8 2 19 1  union 8 11 19 19 16 8 1 10 13  union 11 16 9 11 13 4 19  clear  count  union 5  intersect 1 6  union 6 0 14 5 18 17 19 11  count  union 11  union 7 13 9  count  count  union 7 18 4 9 0  count  add 767  count  union 18  clear  clear  union 19 19 8 17 11 6 1 15 8  remove 387  add 726  elements  intersect 2 15 8  intersect 9 12 17 9 2 18 1  contains 717  clear  add 66  intersect 1 6  count  intersect 19 11 8 0 1 13 8 9  count  count  clear  add 885  clear  union 10 7 19  add 775  add 147  intersect 17 13 1 7  contains 300  elements  add 946  intersect 5 13 12 6 9  intersect 14 12 6 7 3 0 19 6  contains 215  union 8  add 700  contains 567  elements  union 4 18 10 9 9 19 10 18 18  contains 550  union 14 12 6 7 3 0 19 6  count  count  remove 925  elements  add 628  remove 939  contains 620  intersect 15 3  add 237  add 248  contains 971  add 898  count  elements  union 19 8 0 13 18 6 19  clear  count  add 438  count  clear  intersect 16  union 10 7 19  intersect 4 18 10 9 9 19 10 18 18  intersect 1 17 18 0 14 8  count  intersect 12 5 6 18 9 6 11  union 18  contains 934  clear  contains 727  union 4 2 7 13  add 579  clear  remove 944  remove 609  union 4 2 7 13  intersect 19 4 5 0 12  elements  union 18 19  intersect 16 13 3 17 8 10  count  count  contains 461  remove 590  intersect 3 4 17 9 8 2 19 1  add 528  intersect 11 16 9 11 13 4 19  remove 999  union 1  intersect 12 5 6 18 9 6 11  clear  remove 995  remove 972  contains 952  count  clear  remove 316  add 978  count  union 16 3 11 1 2 10 1 5 18  remove 321  count  count  elements  contains 803  remove 365  contains 476  remove 436  remove 146  count  count  intersect 1  clear  count  elements  count  elements  clear  count  add 451  elements  add 549  clear  clear  clear  union 11 14 1 5 10 16  add 530  elements  add 459  union 18 19  clear  add 579  union 19 8 0 13 18 6 19  count  add 871  count  elements  count  clear  contains 129  remove 715  union 11 14 1 5 10 16  remove 406  remove 866  elements  intersect 10 7 19  union 10 9 7 12  add 601  elements  remove 56  clear  add 636  elements  elements  contains 832  remove 820  count  contains 643  contains 946  count  remove 838  intersect 13 14  union 15 15 13 14 5 7 9 4 19  count  clear  union 17 13 1 7  intersect 5 13 12 6 9  clear  contains 15  remove 230  clear  add 44  remove 493  remove 787  count  clear  add 586  count  contains 296  remove 969  contains 473  remove 787  union 16  elements  remove 512  elements  elements  count  union 18 8 3 4 12 15 19 16 14  intersect 5 13 12 6 9  intersect 1 6  add 381  elements  intersect 8 11 19 19 16 8 1 10 13  clear  add 955  add 28  union 18 8 3 4 12 15 19 16 14  count  intersect 6 18 7 19 15 10 10  intersect 13 17 3  elements  intersect 18 6 16 17 10 8 10 18  clear  add 125  intersect 15 3  clear  contains 653  clear  remove 239  intersect 7 18 4 9 0  remove 272  elements  add 653  union 18 1 18 14  intersect 10 9 7 12  contains 920  clear  count  union 15 15 13 14 5 7 9 4 19  union 3  remove 880  add 382  union 17 19 13 18 1  remove 140  elements  count  add 374  contains 857  intersect 6 11  elements  elements  clear  clear  intersect 13  remove 31  union 14 5 4 8 14  clear  count  count  union 3  remove 984  union 5 11 5 0  remove 728  elements  clear  remove 692  elements  union 6 18 7 19 15 10 10  clear  contains 359  clear  count  union 17 10 13  union 2 0 3 16 2  count  add 901  clear  add 660  intersect 14 10 18 1 0 12 10  add 2  remove 392  intersect 19 6 13 7 15 18  union 6 11  contains 150  elements  remove 233  intersect 9 9 9 2 19 10  union 19 19 8 17 11 6 1 15 8  contains 336  contains 936  add 393  contains 101  union 3  union 17 13 1 7  union 7 13 9  remove 744  intersect 11 10  elements  remove 72  intersect 17 19 13 18 1  union 4 15 2 3 7 12 1 0  union 2 0 3 16 2  remove 378  remove 327  count  count  intersect 16  remove 441  clear  elements  clear  elements  remove 87  clear  elements  intersect 15 5 1  contains 657  clear  contains 183  elements  remove 726  union 10 16 12 2 7 13 19 1 8  union 7 0 12 15 3 8  remove 800  count  union 7 18 4 9 0  clear  contains 877  elements  add 993  remove 333  union 18 8 3 4 12 15 19 16 14  contains 781  union 8 16  union 2 15 8  add 151  clear  intersect 19 17 0 10 9 18 12 17  count  remove 852  add 943  elements  union 12 14 19 15  clear  intersect 2 17 15 10  clear  union 5 5 12 9  clear  elements  intersect 18 8 3 4 12 15 19 16 14  union 18 8 3 4 12 15 19 16 14  add 518  clear  elements  elements  elements  elements  add 261  remove 649  clear  elements  contains 361  count  add 830  count  add 581  add 58  clear  union 19 8 0 13 18 6 19  elements  contains 180  add 247  intersect 13 3 16 1  contains 898  union 1 19 5 7 17 16 1  elements  count  add 83  union 19 11 8 0 1 13 8 9  count  count  count  clear  remove 690  contains 901  elements  count  union 4 15 2 3 7 12 1 0  add 460  add 208  union 19 17 0 10 9 18 12 17  clear  intersect 3 4 17 9 8 2 19 1  add 817  clear  clear  clear  union 0 4 3  add 682  count  elements  intersect 11 5 9 9 4 16 12 2 8  intersect 15 10 16 11 5  contains 607  union 1 19 5 7 17 16 1  intersect 15 15 13 14 5 7 9 4 19  remove 692  remove 721  intersect 10  clear  union 16 8  add 569  elements  intersect 12 17 6 1 18  remove 658  add 817  elements  elements  intersect 3 4 17 9 8 2 19 1  elements  union 1 17 18 0 14 8  add 650  intersect 16 3 11 1 2 10 1 5 18  add 304  intersect 13 17 3  count  intersect 6 3 2 12 0 5 9 9 13  remove 787  union 10 12 14 18 7  intersect 18 8 3 4 12 15 19 16 14  remove 139  remove 962  count  union 16 15 11 4 11 18 8  intersect 9 14 4 15 5 6 10 3  intersect 10 9 7 12  intersect 14 12 6 7 3 0 19 6  add 731  clear  intersect 5 13 12 6 9  clear  intersect 17 19 13 18 1  remove 733  intersect 1 17 18 0 14 8  union 10 16 12 2 7 13 19 1 8  count  contains 311  count  contains 74  clear  elements  intersect 13  elements  intersect 5 11 5 0  union 19 17 0 10 9 18 12 17  clear  contains 76  count  intersect 10 9 7 12  contains 713  elements  intersect 5 5 12 9  add 326  elements  contains 605  add 532  remove 790  contains 198  union 1  intersect 16 3 11 1 2 10 1 5 18  add 909  count  elements  elements  clear  add 28  union 8 18 2  union 1 19 5 7 17 16 1  intersect 2 0 3 16 2  intersect 3 18  contains 341  remove 56  count  add 414  intersect 11  remove 639  elements  clear  contains 799  union 5  add 669  contains 517  elements  elements  clear  elements  remove 288  count  elements  contains 746  union 19 17 0 10 9 18 12 17  intersect 17 1 1 4 4 12  remove 34  union 4 18 10 9 9 19 10 18 18  add 495  contains 135  clear  elements  count  contains 266  contains 958  remove 678  elements  remove 145  contains 444  intersect 12 17 6 1 18  elements  union 14 12 6 7 3 0 19 6  intersect 16 8  clear  elements  elements  intersect 2 0 3 16 2 | False  2  0  False  0  False  False  False  False  1  1  1  4 11 13 15 16 123 296  False  False  False  2 10 15 17  False  4  False  True  False  1  726  False  False  False  5  5  False  5  False  False  False  1  1  False  False  1  False  0  False  False  False  False  483 506  False  483 506  False  False  0 1 4 7 8 11 17  False  False  False  0  3 4 8 12 14 15 16 18 19 755 827 857 883  13  False  0  2  0 7 9 12 14  False  False  0  False  True  False  763  2 8 15 763  False  1  0 3 7 8 12 15 259  False  0  False  False  False  0  0  False  False  16 403  16 403  False  False  False  1 16 18 19  False  1 16 18 19  4 8 11 15 16 18  10  False  False  1  1  1  774  False  1  1  1  False  False  False  0  False  5  False  False  False  False  False  False  False  False  False  False  False  False  5 6 9 11 12 18  False  False  0  1 5 10 11 14 16 195  False  False  False  0  False  False  1  False  False  False  False  False  False  False  0  False  False  6  6  False  False  False  0 5 11  False  False  False  0  0  False  False  False  12  8  1 5 7 16 17 19  False  False  False  0  False  False  False  False  False  1 297  False  False  False  0  8  0  False  False  7  0 1 10 12 14 18 571  False  False  False  False  2  False  0  False  0  1  False  1 5 9 11 14 15 16 18 19 330  False  0  8  11  11  12  13  False  1 6 8 11 15 17 19 726  False  0  0  0  False  7  False  False  8 700  False  13  13  False  0 3 4 6 7 8 9 10 12 14 18 19 700  False  False  False  4  3 237 248 898  0  1  0  False  False  False  False  4  0  0  False  False  False  False  False  False  0  False  1  False  9  9  1 2 3 5 10 11 16 18 978  False  False  False  False  False  9  9  0  0  0  451  1 5 10 11 14 16 530  7  8  0 6 8 13 18 19 579 871  8  False  False  False  False  1 5 10 11 14 16  7 9 10 12 601  False  636  636  False  False  1  False  False  1  False  8  False  False  False  False  1  1  False  False  False  False  16 586  False  16 586  16 586  2  381  11  False  False  False  False  0  False  False  1 3 4 5 7 9 13 14 15 17 18 19 382  13  False  False  0  0  False  False  0 3 5 11  False  False  0  7  False  False  6 11  False  False  False  False  False  11  False  False  False  9  9  False  False  False  False  False  False  12  False  False  False  0  False  943  False  False  0  1  0 6 8 13 18 19  False  False  1 5 7 13 16 17 19  7  12  12  12  False  False  0  4  0 3 4 682  False  False  False  8 16 569  False  817  817  0  False  False  False  3  False  9  False  9  False  False  0  False  326  False  False  False  2  1 909  1 909  False  False  0  False  False  False  5 669  5 669  False  0  False  False  False  0  False  False  False  False  False |
| Задача 5. BiDictionary | |
| **Условие**  Реализирайте хеш-таблица, която съхранява тройки стойности (ключ1, ключ2, стойност) и позволява бързо търсене по двойка ключове и добавяне на тройки стойности.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху хеш-талица с два ключа и стойност от целочислен тип. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add k1 k2 v –добавя запис в хеш-таблицата, като k1 е ключ1, k2 – ключ2, а v - стойността. Ако хеш-таблицата вече съдържа такъв запис, на екрана се изписва "False" на нов ред.  count – изписва на екрана съобщение "c", където c е броят записи в хеш-таблицата.  contains k1 k2 – ако хеш-таблицата съдържа запис с ключове k1 и k2, на екрана се изписва съобщение "True". В противен случай на екрана се изписва съобщение "False".  value k1 k2 – печата на конзолата стойността, която отговаря в хеш-таблицата на двата ключа k1 и k2. Ако записът липсва от таблицата, на екрана се изписва "False" на нов ред.  Пример:  6  add 1 2 3  add 2 3 4  count  contains 5 6  contains 1 2  value 2 3  Резултат:  2  False  True  4 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  Използвайте Dictionary<string, int>, където ключ е конкатенирани двата ключа. | |
| **Решение (сорс код)** | |
| using System;  using System.Text;  using System.Collections.Generic;  class BiDictionary<K1, K2, V>  {  Dictionary<string, V> container;  public int Count  {  get  {  return container.Count;  }  }  public V this[K1 key1, K2 key2]  {  get  {  string actualKey = GenerateActualKey(key1, key2);  V result;  if (this.container.ContainsKey(actualKey))  {  result = this.container[actualKey];  }  else  {  result = default(V);  }  return result;  }  }  public BiDictionary()  {  this.container = new Dictionary<string, V>();  }  public bool Add(K1 key1, K2 key2, V value)  {  if (this.Contains(key1, key2))  {  return false;  }  else  {  string actualKey = GenerateActualKey(key1, key2);  container[actualKey] = value;  return true;  }  }  public bool Contains(K1 key1, K2 key2)  {  string actualKey = GenerateActualKey(key1, key2);  bool containsActualKey = container.ContainsKey(actualKey);  return containsActualKey;  }  private string GenerateActualKey(K1 key1, K2 key2)  {  string resultKey = key1 + " " + key2;  return resultKey;  }  }  class CommnadExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  BiDictionary<int, int, int> dict = new BiDictionary<int, int, int>();  ExecuteCommands(dict);  Console.WriteLine(output.ToString().Trim());  }  private static void ExecuteCommands(BiDictionary<int, int, int> dict)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, dict);  }  }  private static void ExecuteCommands(string command, BiDictionary<int, int, int> dict)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, dict);  break;  case "count":  ExecuteCountCommand(dict);  break;  case "contains":  ExecuteContainsCommand(tokens, dict);  break;  case "value":  ExecuteValueCommand(tokens, dict);  break;  default:  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteValueCommand(string[] tokens, BiDictionary<int, int, int> dict)  {  int key1 = int.Parse(tokens[1]);  int key2 = int.Parse(tokens[2]);  int value = dict[key1, key2];  if (value != 0)  {  PrintLine(value.ToString());  }  else  {  PrintLine(false.ToString());  }  }  private static void ExecuteAddCommand(string[] tokens, BiDictionary<int, int, int> dict)  {  int key1 = int.Parse(tokens[1]);  int key2 = int.Parse(tokens[2]);  int value = int.Parse(tokens[3]);  bool isCommandSuccessful = dict.Add(key1, key2, value);  if (!isCommandSuccessful)  {  PrintLine(isCommandSuccessful.ToString());  }  }  private static void ExecuteCountCommand(BiDictionary<int, int, int> dict)  {  int count = dict.Count;  PrintLine(count.ToString());  }  private static void ExecuteContainsCommand(string[] tokens, BiDictionary<int, int, int> dict)  {  int key1 = int.Parse(tokens[1]);  int key2 = int.Parse(tokens[2]);  bool contains = dict.Contains(key1, key2);  PrintLine(contains.ToString());  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 6  add 1 2 3  add 2 3 4  count  contains 5 6  contains 1 2 | 2  False  True  4 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 990  add 37 16 67  add 61 32 74  add 16 72 85  add 67 76 14  add 64 81 36  add 71 87 44  add 26 32 80  add 56 57 53  add 12 39 64  add 29 31 36  add 25 41 55  add 10 90 81  add 29 37 21  add 97 79 13  add 71 88 30  add 52 98 38  add 29 43 66  add 22 12 76  add 54 54 96  add 42 81 78  add 51 83 55  add 46 49 55  add 35 24 39  add 10 97 40  add 12 96 44  add 34 53 84  add 60 78 59  add 83 74 18  add 19 94 88  add 52 20 22  add 88 42 12  add 73 44 41  add 24 79 36  add 46 20 11  add 99 38 68  add 90 11 49  add 15 48 31  add 19 71 73  add 83 64 79  add 50 85 53  add 47 11 39  add 47 72 53  add 93 90 69  add 51 54 89  add 92 51 92  add 23 35 48  add 15 44 62  add 41 20 57  add 85 52 30  add 72 46 23  add 94 32 22  add 11 59 50  add 74 93 98  add 93 29 12  add 63 86 97  add 19 71 67  add 43 56 39  add 33 11 23  add 37 59 39  add 22 29 50  add 93 33 17  add 21 57 30  add 50 19 34  add 48 20 33  add 65 39 85  add 30 51 14  add 79 52 72  add 89 22 98  add 46 51 20  add 63 30 71  add 36 73 59  add 76 38 18  add 35 16 35  add 44 94 35  add 28 45 68  add 85 85 76  add 20 90 49  add 99 47 70  add 68 99 29  add 92 89 95  add 43 55 18  add 87 25 99  add 25 69 67  add 61 11 10  add 96 31 14  add 88 21 27  add 46 90 24  add 75 78 58  add 49 27 35  add 77 93 50  add 91 98 81  add 79 51 83  add 99 78 61  add 85 19 62  add 38 30 47  add 11 65 75  add 20 38 79  add 75 69 72  add 80 20 95  add 40 86 18  add 16 56 44  add 27 87 53  add 64 12 12  add 56 53 93  add 32 43 30  add 72 48 91  add 16 57 90  add 24 71 92  add 21 52 90  add 30 79 30  add 85 49 79  add 67 25 56  add 26 69 68  add 66 67 31  add 64 15 90  add 96 78 25  add 20 60 45  add 63 48 15  add 22 96 65  add 69 28 71  add 10 64 58  add 13 95 85  add 31 32 89  add 88 61 37  add 34 86 62  add 80 53 72  add 63 24 83  add 12 98 98  add 43 10 68  add 29 70 89  add 75 91 82  add 58 90 64  add 69 58 99  add 66 64 19  add 91 79 90  add 22 25 51  add 33 53 81  add 92 95 87  add 96 47 41  add 71 41 30  add 59 32 10  add 98 25 79  add 90 20 50  add 79 10 12  add 49 58 17  add 19 76 68  add 70 45 86  add 32 30 86  add 59 27 38  add 24 97 34  add 74 12 97  add 55 47 84  add 45 81 49  add 33 25 63  add 63 37 83  add 39 60 56  add 34 90 90  add 72 22 46  add 34 99 40  add 79 86 28  add 61 90 83  add 80 73 36  add 63 55 36  add 24 70 78  add 55 37 57  add 56 32 33  add 44 98 88  add 85 56 13  add 19 60 12  add 77 15 89  add 63 57 97  add 85 59 37  add 31 26 61  add 39 63 76  add 66 60 16  add 85 12 57  add 51 59 77  add 68 38 45  add 47 96 11  add 34 17 47  add 70 34 11  add 95 61 47  add 83 73 83  add 98 17 75  add 99 90 74  add 82 73 95  add 80 21 14  add 62 77 13  add 23 31 21  add 10 88 21  add 21 31 80  add 55 28 51  add 31 49 99  add 42 20 12  add 39 18 87  add 57 15 93  add 69 34 14  add 95 24 60  add 78 85 25  add 92 10 48  add 69 73 21  add 78 69 27  add 28 24 32  add 11 38 42  add 37 75 34  add 24 73 45  add 89 88 65  add 95 51 15  add 69 35 23  add 93 81 37  add 16 11 59  add 91 67 19  add 52 19 33  add 75 27 48  add 38 14 33  add 14 70 17  add 18 93 33  add 24 58 22  add 48 34 24  add 24 63 25  add 78 24 14  add 28 87 62  add 86 27 55  add 58 47 95  add 94 82 72  add 44 43 36  add 97 77 79  add 13 35 81  add 89 11 20  add 66 30 58  add 41 81 88  add 13 32 98  add 39 77 28  add 91 27 87  add 88 19 89  add 18 21 48  add 45 80 99  add 36 15 80  add 34 51 66  add 55 39 91  add 78 78 21  add 17 50 83  add 24 75 11  add 41 16 22  add 42 37 60  add 32 51 73  add 96 54 16  add 60 33 90  add 28 25 72  add 10 22 53  add 96 37 42  add 14 34 42  add 39 47 30  add 79 68 51  add 14 87 40  add 43 44 22  add 85 52 38  add 44 81 28  add 84 65 35  add 19 22 29  add 22 88 19  add 13 72 79  add 73 45 35  add 82 89 61  add 25 51 75  add 95 25 83  add 28 99 42  add 43 56 27  add 68 68 50  add 34 99 87  add 73 79 52  add 55 16 48  add 14 72 80  add 47 67 76  add 15 62 93  add 40 66 26  add 28 43 53  add 48 16 38  add 64 62 88  add 72 84 12  add 61 47 19  add 75 58 54  add 91 54 50  add 16 83 81  add 63 35 80  add 63 34 56  add 44 65 13  add 78 59 33  add 59 81 52  add 56 55 51  add 88 52 32  add 65 66 18  add 80 81 63  add 13 90 59  add 90 21 36  add 55 70 32  add 30 29 22  add 41 88 60  add 83 21 33  add 12 61 42  add 56 32 13  add 95 86 27  add 32 25 12  add 29 41 24  add 29 89 73  add 54 83 49  add 31 56 64  add 66 48 33  add 79 58 64  add 67 35 46  add 12 52 12  add 85 24 87  add 97 14 91  add 87 96 32  add 83 20 75  add 32 35 12  add 91 73 66  add 77 92 60  add 52 39 43  add 81 33 16  add 68 21 94  add 56 20 51  add 35 91 48  add 60 97 22  add 49 28 33  add 58 27 75  add 54 98 70  add 62 30 91  add 13 69 81  add 40 50 37  add 32 83 44  add 53 13 43  add 27 66 63  add 99 94 57  add 46 89 17  add 50 93 30  add 10 89 53  add 26 11 47  add 90 53 90  add 82 89 61  add 64 25 40  add 67 38 59  add 21 40 73  add 43 79 40  add 62 39 84  add 60 52 38  add 29 64 72  add 14 82 68  add 38 67 93  add 62 34 47  add 39 44 79  add 37 96 65  add 22 61 22  add 14 97 90  add 86 24 76  add 65 12 14  add 71 26 22  add 85 16 76  add 91 22 33  add 72 52 88  add 99 61 44  add 69 26 52  add 77 81 48  add 58 45 16  add 40 50 25  add 83 89 35  add 85 84 60  add 73 74 49  add 36 53 13  add 68 60 69  add 74 82 98  add 67 37 79  add 15 96 85  add 37 76 49  add 36 38 68  add 65 59 66  add 42 14 21  add 42 12 69  add 81 70 46  add 90 30 48  add 15 13 87  add 88 26 16  add 14 93 77  add 92 84 88  add 25 96 72  add 25 74 24  add 37 16 51  add 39 47 29  add 90 21 79  add 72 89 23  add 98 62 10  add 35 39 87  add 81 32 86  add 58 84 41  add 89 84 49  add 75 48 29  add 73 71 49  add 14 36 51  add 82 56 65  add 73 75 77  add 28 53 85  add 60 34 57  add 80 47 73  add 49 41 49  add 43 43 75  add 90 16 92  add 80 60 22  add 28 77 68  add 17 52 64  add 62 21 16  add 24 43 10  add 63 64 85  add 16 16 30  add 10 23 17  add 61 41 37  add 22 54 86  add 79 59 80  add 76 28 96  add 37 36 48  add 16 35 91  add 74 70 95  add 57 38 23  add 45 52 70  add 84 16 35  add 56 98 87  add 84 88 74  add 19 99 11  add 75 60 15  add 50 20 35  add 59 74 54  add 46 86 61  add 57 75 46  add 11 78 99  add 47 87 41  add 96 17 12  add 36 49 28  add 46 44 81  add 80 83 20  add 53 46 67  add 36 49 40  add 62 80 72  add 61 97 88  add 78 49 55  add 71 96 23  add 68 77 88  add 93 72 50  add 68 27 64  add 29 44 59  add 76 67 95  add 77 31 33  add 55 28 95  add 38 68 20  add 33 70 39  add 61 26 51  add 40 55 38  add 43 87 43  add 89 98 75  add 10 67 29  add 53 49 68  add 77 18 88  add 16 16 77  add 14 99 95  add 26 14 26  add 93 89 14  add 84 60 51  add 93 16 56  add 51 93 15  add 58 75 23  add 66 38 37  add 20 85 39  add 13 25 87  add 51 97 52  add 44 10 90  add 67 59 16  add 59 21 17  add 94 82 11  add 91 94 65  add 62 77 57  add 30 61 36  add 29 60 24  add 50 51 77  add 85 96 64  add 31 36 77  add 78 28 95  add 24 46 15  add 41 87 11  add 53 91 96  add 32 38 81  add 97 63 71  add 15 53 65  add 40 58 43  add 99 58 31  add 65 15 63  add 55 68 22  add 49 20 14  add 10 58 84  add 55 78 11  add 56 52 24  add 81 20 25  add 53 75 67  add 70 93 49  add 74 98 53  add 50 18 12  add 49 71 93  add 74 50 80  add 57 16 56  add 91 92 11  add 53 39 19  add 52 19 33  add 18 67 28  add 34 72 74  add 49 29 31  add 27 43 18  add 95 45 47  add 47 37 35  add 97 19 85  add 98 38 52  add 47 85 73  add 32 33 97  add 41 17 72  add 71 91 26  add 30 16 79  add 71 69 69  add 41 46 58  add 87 62 50  add 76 91 71  add 69 11 80  add 48 62 32  add 64 64 20  add 92 75 91  add 59 46 67  add 25 92 75  add 75 82 97  add 67 61 95  add 30 85 50  add 35 17 67  add 47 40 27  add 35 52 32  add 70 58 61  add 33 93 25  add 36 95 96  add 65 53 72  add 68 40 85  add 34 73 65  add 78 58 40  add 74 97 60  add 59 84 18  add 99 65 56  add 69 73 91  add 21 11 53  add 67 24 18  add 67 25 87  add 93 19 61  add 63 39 12  add 45 74 17  add 45 63 12  add 84 59 48  add 81 34 40  add 15 46 28  add 88 65 64  add 96 20 25  add 13 81 72  add 71 63 95  add 94 72 59  add 21 15 19  add 77 37 26  add 79 84 69  add 21 51 49  add 19 73 83  add 47 22 99  add 86 18 88  add 39 92 82  add 86 24 48  add 55 57 66  add 94 57 21  add 21 55 27  add 23 25 38  add 88 34 66  add 15 16 31  add 48 97 39  add 11 37 40  add 12 66 34  add 17 24 40  add 11 81 92  add 91 68 15  add 64 62 53  add 58 49 78  add 36 97 30  add 28 34 27  add 24 30 27  add 91 76 23  add 94 75 98  add 23 90 77  add 92 25 31  add 83 78 48  add 87 85 35  add 93 43 71  add 63 17 26  add 51 58 32  add 49 79 67  add 50 54 35  add 30 50 14  add 13 77 10  add 81 63 69  add 50 13 80  add 13 32 70  add 74 16 38  add 93 43 99  add 21 66 22  add 60 89 89  add 39 69 72  add 17 79 88  add 88 26 46  add 98 16 78  add 83 29 71  add 22 69 19  add 78 96 34  add 50 36 54  add 24 37 31  add 59 84 98  add 28 50 55  add 96 64 15  add 87 93 59  add 28 75 40  add 59 13 17  add 55 73 47  add 72 85 31  add 84 44 69  add 30 77 95  add 24 43 72  add 90 29 37  add 76 23 42  add 96 62 84  add 76 88 48  add 12 93 14  add 43 45 30  add 34 59 21  add 79 68 55  add 40 94 29  add 45 91 85  add 53 81 73  add 59 23 33  add 38 50 70  add 39 62 80  add 98 84 32  add 11 91 69  add 16 68 25  add 68 22 19  add 18 55 67  add 71 98 94  add 36 79 23  add 98 35 87  add 23 74 37  add 69 68 56  add 22 45 25  add 98 50 73  add 41 59 21  add 94 29 84  add 89 22 90  add 78 39 40  add 81 46 69  add 84 57 51  add 98 15 48  add 82 13 21  add 16 97 97  add 23 13 83  add 89 37 71  add 78 34 83  add 15 44 19  add 81 79 41  add 18 71 84  add 81 58 27  add 10 13 26  add 41 91 67  add 63 75 14  add 85 94 72  add 31 65 30  add 94 60 14  add 66 24 39  add 28 94 21  add 20 86 56  add 18 13 50  add 76 41 98  add 75 84 97  add 99 20 68  add 37 80 90  add 99 89 24  add 61 26 59  add 63 72 46  add 47 98 66  add 24 17 70  add 61 99 61  add 26 25 52  add 35 95 13  add 95 16 74  add 88 33 61  add 81 39 51  add 48 98 77  add 54 50 11  add 19 37 88  add 38 43 11  add 73 51 43  add 69 16 14  add 33 47 40  add 55 20 81  add 57 58 43  add 48 50 64  add 94 83 30  add 27 75 90  add 31 25 86  add 95 83 43  add 93 46 78  add 20 20 74  add 55 65 52  add 99 84 98  add 87 57 73  add 85 46 22  add 57 85 70  add 33 51 37  add 25 11 33  add 72 57 75  add 18 32 23  add 32 21 55  add 27 63 53  add 19 57 56  add 33 30 58  add 49 43 75  add 38 78 64  add 60 96 60  add 82 89 77  add 32 61 35  add 40 33 23  add 97 89 64  add 55 76 78  add 99 50 44  add 56 19 32  add 56 56 87  add 13 24 65  add 80 93 34  add 94 22 94  add 30 15 16  add 23 97 52  add 28 17 39  add 54 12 16  add 38 80 89  add 46 92 65  add 34 43 86  add 51 15 57  add 55 28 54  add 12 83 41  add 14 13 12  add 84 33 76  add 87 21 44  add 32 21 80  add 50 32 25  add 20 90 42  add 59 52 86  add 57 64 20  add 49 40 78  add 89 68 99  add 67 18 74  add 71 42 64  add 47 27 11  add 67 60 48  add 70 90 47  add 46 49 30  add 10 89 75  add 42 47 47  add 33 24 22  add 25 13 51  add 88 52 88  add 63 40 87  add 91 65 73  add 31 67 64  add 87 52 39  add 67 71 11  add 79 30 56  add 48 46 97  add 48 30 52  add 60 89 68  add 12 87 11  add 74 47 59  add 60 94 24  add 73 70 59  add 51 88 61  add 84 44 50  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19 74  add 28 51 68  add 37 59 73  add 17 14 20  add 28 48 67  add 87 57 47  add 81 47 49  add 79 87 61  add 17 62 34  add 91 93 99  add 17 76 58  add 72 60 16  add 22 10 20  add 26 29 64  add 72 29 48  add 12 45 65  add 98 90 81  add 80 89 32  add 48 37 49  add 98 17 82  add 40 32 19  add 77 60 66  add 98 36 57  add 55 28 37  add 20 18 41  add 79 62 46  add 77 86 61  add 79 52 99  add 47 28 50  add 35 87 72  add 33 93 56  add 42 61 78  add 99 77 10  add 75 10 51  add 86 87 11  add 99 78 18  add 37 92 34  add 78 58 46  add 45 94 57  add 15 92 90  add 17 41 88  add 52 18 89  add 77 71 93  add 86 81 48  add 84 11 26  add 36 51 51  add 41 77 55  add 52 64 73  add 96 84 83  add 89 16 12  add 12 88 59  add 64 97 47  add 55 12 11  add 76 50 89  add 90 47 70  add 63 18 93  add 97 10 51  add 98 80 66  add 98 97 48  add 92 44 87  add 40 91 35  add 62 69 26  add 94 28 77  add 46 38 65  add 94 47 19  add 56 45 65  add 46 33 16  add 12 51 73  add 60 36 44  add 82 53 59  add 83 95 16  add 13 23 42  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 False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  923 |
| **Вход** | **Изход** |
| 145  value 42 242  count  value 126 744  value 481 89  value 23 737  value 678 275  add 777 357 179  count  count  contains 481 241  contains 777 806  count  add 844 470 752  contains 278 990  value 770 997  add 945 874 982  add 364 786 424  contains 965 809  count  contains 191 274  add 489 421 760  add 140 349 937  contains 352 245  count  count  add 559 687 447  count  value 178 233  count  count  contains 116 454  add 61 841 643  value 239 279  count  contains 788 568  add 603 857 828  add 348 629 797  value 515 334  add 277 362 44  value 12 41  contains 133 844  contains 712 919  count  add 882 593 5  add 792 528 770  add 379 722 922  count  add 145 726 780  add 938 887 904  contains 281 714  count  count  count  value 655 724  count  value 938 540  value 465 36  value 649 722  value 385 158  value 322 902  contains 815 446  count  add 394 773 31  count  contains 601 879  contains 951 356  contains 115 394  value 830 984  value 314 679  contains 988 599  add 82 519 406  count  count  contains 603 621  contains 248 660  add 118 906 156  count  value 156 200  contains 366 245  count  value 26 491  value 853 500  value 716 74  value 557 949  value 126 302  count  add 348 735 37  value 733 927  contains 77 653  value 814 533  value 901 849  value 249 642  count  value 595 750  add 754 532 585  add 561 957 291  count  contains 669 123  count  contains 207 403  add 98 779 839  add 565 952 182  count  value 707 112  contains 483 30  contains 482 598  contains 282 334  add 694 151 120  count  contains 252 864  contains 552 217  contains 845 611  add 121 755 550  contains 802 349  count  count  value 844 675  value 532 82  contains 750 16  value 69 882  count  contains 719 837  value 699 318  contains 340 490  count  value 872 856  count  contains 47 60  count  value 848 354  count  count  contains 912 720  value 24 801  add 703 776 728  value 493 36  contains 670 102  add 677 998 363  count  value 897 675  contains 913 703  value 444 84  add 49 329 443  add 972 979 535  contains 539 289 | False  0  False  False  False  False  1  1  False  False  1  False  False  False  4  False  False  6  6  7  False  7  7  False  False  8  False  False  False  False  False  11  14  False  16  16  16  False  16  False  False  False  False  False  False  16  17  False  False  False  False  False  False  18  18  False  False  19  False  False  19  False  False  False  False  False  19  False  False  False  False  False  20  False  22  False  22  False  24  False  False  False  False  25  False  False  False  False  26  26  False  False  False  False  26  False  False  False  26  False  26  False  26  False  26  26  False  False  False  False  28  False  False  False  False |
| **Вход** | **Изход** |
| 185  count  add 373 42 30  count  count  count  count  contains 42 2  count  value 425 741  contains 901 811  value 426 894  add 158 309 113  add 305 868 168  contains 944 984  count  value 500 609  add 223 712 918  count  add 605 93 394  count  add 846 874 36  add 877 68 433  count  value 214 732  value 344 986  count  add 20 97 17  add 24 924 132  count  contains 99 12  value 688 622  add 915 723 55  count  value 132 529  add 916 906 253  contains 394 284  count  count  value 990 77  contains 996 376  count  value 921 742  contains 423 778  add 468 811 271  add 817 194 288  contains 476 995  count  add 101 221 771  count  contains 201 371  contains 80 974  contains 37 68  contains 460 70  contains 251 581  add 288 859 438  count  count  add 467 111 80  count  contains 82 93  value 274 41  add 602 4 348  add 48 975 493  add 234 81 277  contains 218 989  add 413 385 741  add 782 328 984  count  contains 260 649  contains 461 528  value 102 264  count  value 935 247  add 54 240 883  value 242 100  add 189 377 862  count  count  contains 708 224  add 258 885 618  contains 614 791  count  count  add 671 290 979  add 314 361 54  value 180 330  contains 357 838  add 884 329 544  value 787 260  add 860 235 877  add 161 971 316  contains 618 263  value 583 912  contains 810 183  add 63 500 360  count  count  count  contains 675 420  value 734 182  add 908 610 40  value 811 54  add 782 153 390  contains 242 562  add 658 774 925  contains 73 145  count  value 287 899  value 371 857  add 555 740 171  contains 552 547  count  add 542 54 759  value 82 393  value 109 622  add 925 311 64  value 495 284  contains 36 701  add 323 140 995  count  add 947 227 412  add 155 690 14  contains 427 231  value 754 318  add 975 908 177  count  value 445 546  add 654 245 887  value 515 846  count  value 402 58  count  contains 135 166  count  value 467 377  value 599 637  contains 624 529  count  value 726 181  add 864 201 993  contains 857 572  add 331 233 174  add 447 518 829  value 434 759  value 809 409  count  value 417 534  value 451 985  contains 357 579  contains 120 83  value 537 857  count  value 277 593  count  contains 234 202  contains 151 119  value 812 95  contains 45 916  value 858 55  value 459 702  count  contains 544 973  contains 632 47  count  value 291 954  add 851 651 215  add 727 574 214  value 795 332  add 809 262 996  count  add 311 904 481  add 867 205 870  add 787 585 581  contains 696 787  count  contains 858 987  contains 394 700  contains 131 481  contains 669 907  add 441 735 711  contains 136 844  add 850 809 880  add 645 780 208  count  add 992 644 94 | 0  1  1  1  1  False  1  False  False  False  False  3  False  4  5  7  False  False  7  9  False  False  10  False  False  11  11  False  False  11  False  False  False  13  14  False  False  False  False  False  15  15  16  False  False  False  21  False  False  False  21  False  False  23  23  False  False  24  24  False  False  False  False  False  False  30  30  30  False  False  False  False  False  33  False  False  False  34  False  False  False  False  37  False  False  40  False  False  41  False  41  False  41  False  False  False  41  False  False  False  False  44  False  False  False  False  False  44  False  44  False  False  False  False  False  False  44  False  False  44  False  False  47  False  50  False  False  False  False  False  53 |
| **Вход** | **Изход** |
| 192  add 844 423 141  count  count  contains 713 351  count  add 184 359 894  contains 377 85  value 834 675  add 45 750 978  add 740 613 373  count  add 698 926 485  count  contains 394 674  contains 105 762  contains 892 451  contains 2 195  count  count  add 888 922 276  value 198 799  add 94 445 984  contains 836 252  count  add 618 120 698  value 167 181  contains 414 886  add 996 235 593  add 975 961 344  count  count  contains 321 421  add 286 645 616  count  add 686 494 925  count  contains 344 899  value 496 481  add 932 185 508  count  value 202 564  contains 862 470  add 266 486 992  value 785 197  add 411 267 550  value 474 728  count  add 570 637 248  count  add 464 863 253  count  count  value 31 185  add 81 99 437  value 662 228  count  count  value 559 702  value 85 213  contains 50 711  value 997 688  contains 926 268  contains 377 559  count  add 666 420 971  add 915 326 186  count  count  contains 65 164  contains 136 804  contains 629 310  count  contains 707 275  contains 33 33  count  count  add 831 907 381  add 825 205 767  count  contains 535 867  value 27 95  contains 995 714  value 982 494  add 578 900 67  add 753 525 390  value 937 132  count  value 31 618  contains 334 962  count  contains 369 391  add 94 442 619  contains 611 669  contains 319 200  contains 957 31  count  add 313 921 71  contains 377 625  contains 403 448  value 995 477  add 661 751 493  count  add 731 477 806  contains 561 131  value 720 150  contains 932 904  value 999 365  contains 20 40  count  value 992 766  count  contains 993 735  contains 134 600  value 567 706  add 832 300 775  add 688 360 939  value 656 474  add 470 543 968  value 111 538  contains 711 225  contains 133 964  add 115 631 826  contains 779 119  add 51 225 872  add 698 589 329  count  contains 328 54  count  count  count  add 450 766 629  add 62 334 856  count  count  contains 336 749  add 57 534 433  value 536 299  value 245 671  value 297 522  add 307 30 897  contains 798 672  contains 895 181  add 876 755 57  value 195 744  count  count  count  value 244 275  add 894 68 798  value 439 974  value 880 332  contains 853 26  value 583 766  value 663 143  add 875 474 557  add 479 458 784  contains 171 501  value 682 963  add 885 3 537  value 680 166  value 402 179  contains 255 204  value 370 160  contains 483 698  contains 54 399  contains 336 837  count  contains 654 473  contains 379 397  value 889 994  value 580 229  value 983 976  count  count  count  add 975 274 645  count  count  count  add 235 987 908  contains 213 666  contains 680 146  contains 447 796  value 145 437  count  value 429 579  contains 582 715  contains 786 926  count  count  value 44 888  add 132 167 362 | 1  1  False  1  False  False  4  5  False  False  False  False  5  5  False  False  7  False  False  10  10  False  11  12  False  False  13  False  False  False  False  15  16  17  17  False  False  18  18  False  False  False  False  False  False  18  20  20  False  False  False  20  False  False  20  20  22  False  False  False  False  False  24  False  False  24  False  False  False  False  25  False  False  False  27  False  False  False  False  False  28  False  28  False  False  False  False  False  False  False  False  34  False  34  34  34  36  36  False  False  False  False  False  False  False  39  39  39  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  43  False  False  False  False  False  43  43  43  44  44  44  False  False  False  False  45  False  False  False  45  45  False |
| **Вход** | **Изход** |
| 134  value 842 340  contains 610 851  count  add 145 723 746  contains 46 225  value 189 51  add 789 788 398  add 591 617 277  add 884 1 706  contains 275 433  count  add 557 676 743  value 878 248  add 520 738 745  value 621 419  value 735 128  contains 709 882  contains 950 639  count  contains 346 391  value 378 508  contains 448 312  add 7 667 132  count  add 275 540 751  value 400 845  value 656 800  add 266 578 846  contains 551 837  add 918 425 21  contains 487 282  contains 11 175  count  count  contains 412 198  contains 682 568  count  count  value 72 238  count  value 689 590  value 112 929  contains 882 761  count  value 748 707  count  contains 788 258  add 866 225 548  count  add 388 820 663  value 277 132  add 935 16 679  add 141 848 896  count  contains 82 457  count  contains 248 493  count  value 257 939  contains 83 808  add 13 858 499  contains 202 126  count  add 440 749 552  count  value 68 688  count  value 891 923  contains 784 767  add 679 891 894  count  value 638 338  count  add 126 811 666  add 642 298 694  add 96 48 17  contains 148 915  contains 381 206  value 158 753  add 259 420 245  contains 819 658  count  value 679 394  add 262 426 206  add 402 528 641  count  add 714 451 735  value 468 530  value 302 989  contains 664 180  contains 965 866  count  count  count  value 639 387  count  count  contains 915 403  contains 709 501  value 678 333  contains 556 446  value 684 494  count  count  contains 5 766  add 730 921 527  count  count  contains 980 92  value 843 809  count  add 81 834 65  value 266 800  add 884 330 505  add 518 58 705  value 178 533  value 382 686  count  value 993 875  count  count  value 998 585  contains 831 747  add 774 603 660  add 480 416 204  value 231 399  count  count  value 280 994  add 913 285 886  count  contains 733 156  value 189 547  value 999 11 | False  False  0  False  False  False  4  False  False  False  False  False  6  False  False  False  7  False  False  False  False  False  10  10  False  False  10  10  False  10  False  False  False  10  False  10  False  11  False  14  False  14  False  14  False  False  False  15  16  False  16  False  False  17  False  17  False  False  False  False  21  False  23  False  False  False  False  24  24  24  False  24  24  False  False  False  False  False  24  24  False  25  25  False  False  25  False  False  False  28  False  28  28  False  False  False  30  30  False  31  False  False  False |
| **Вход** | **Изход** |
| 104  contains 200 784  count  add 753 623 111  count  add 955 803 473  contains 375 95  add 561 796 421  add 536 240 745  contains 51 195  contains 914 58  contains 24 735  value 414 200  value 11 431  value 255 856  count  count  contains 615 92  value 523 203  contains 175 625  value 903 78  value 38 778  add 558 915 196  add 557 931 67  contains 110 174  count  add 129 811 166  count  add 816 158 898  value 381 183  contains 477 427  count  value 895 335  add 774 232 350  count  count  contains 220 866  contains 548 417  contains 348 920  count  add 813 613 621  value 143 880  value 121 177  contains 485 755  add 531 111 779  value 933 507  value 778 384  value 622 861  value 502 350  contains 678 834  value 69 382  contains 342 274  count  add 893 352 229  add 607 174 464  contains 124 436  contains 928 414  count  count  count  count  value 998 134  add 378 529 579  count  value 694 686  contains 945 769  contains 435 836  contains 588 549  add 218 448 397  add 377 914 904  value 420 378  contains 114 156  contains 275 205  value 515 823  contains 750 710  count  value 989 178  contains 132 492  contains 798 879  contains 294 568  contains 737 981  add 614 675 748  count  count  add 632 789 213  add 229 933 98  value 899 383  contains 967 618  add 199 247 771  count  value 579 722  count  value 987 725  count  value 515 208  value 2 233  add 694 356 389  count  value 263 645  contains 114 818  value 59 582  add 758 800 367  value 491 634  contains 361 235  value 226 504 | False  0  1  False  False  False  False  False  False  False  4  4  False  False  False  False  False  False  6  7  False  False  8  False  9  9  False  False  False  9  False  False  False  False  False  False  False  False  False  False  11  False  False  13  13  13  13  False  14  False  False  False  False  False  False  False  False  False  16  False  False  False  False  False  17  17  False  False  20  False  20  False  20  False  False  21  False  False  False  False  False  False |
| **Вход** | **Изход** |
| 144  contains 104 343  add 470 432 506  add 663 496 193  count  add 519 633 198  add 214 850 337  add 241 764 553  contains 721 781  add 250 71 891  value 334 77  add 257 793 684  count  count  contains 637 51  add 6 686 323  value 568 786  count  count  add 978 263 350  count  value 357 748  contains 425 778  contains 605 279  value 134 385  count  count  count  value 412 729  contains 189 642  contains 985 398  value 512 464  value 531 775  count  value 784 917  add 326 703 787  add 859 459 515  contains 766 189  count  add 381 807 596  contains 249 717  add 697 243 371  count  contains 913 313  value 73 504  contains 320 600  count  count  add 59 624 546  contains 730 126  value 219 209  count  count  add 998 934 49  add 96 623 220  value 955 353  add 269 545 673  count  add 201 868 869  contains 978 676  contains 101 703  add 429 570 423  add 139 269 593  add 787 139 454  count  add 977 239 643  add 705 561 277  add 57 684 597  add 340 585 587  add 321 396 948  count  add 193 649 335  value 213 793  contains 314 885  count  value 742 645  value 493 335  contains 832 539  count  value 372 885  value 133 799  contains 6 125  count  contains 505 56  add 783 589 307  count  count  value 601 826  add 382 829 276  contains 693 93  value 820 564  count  value 176 821  value 510 669  count  add 669 189 418  contains 262 686  count  add 904 28 128  count  value 824 62  add 502 995 857  add 990 912 356  contains 177 96  add 981 962 825  value 702 76  contains 932 637  value 822 566  contains 208 584  add 740 691 224  contains 152 114  contains 261 514  value 310 120  value 832 773  count  add 606 506 146  add 230 426 263  add 891 424 447  contains 429 267  value 405 723  contains 953 953  count  value 866 341  contains 282 890  value 537 176  value 979 440  count  value 701 437  add 510 265 960  contains 261 690  add 580 85 544  count  contains 32 216  value 428 708  contains 639 805  contains 948 535  count  contains 714 618  count  add 29 284 193  value 613 105  contains 993 933  contains 176 168  value 197 345  count | False  2  False  False  7  7  False  False  8  8  9  False  False  False  False  9  9  9  False  False  False  False  False  9  False  False  11  False  13  False  False  False  13  13  False  False  14  14  False  17  False  False  21  26  False  False  27  False  False  False  27  False  False  False  27  False  28  28  False  False  False  29  False  False  29  False  30  31  False  False  False  False  False  False  False  False  False  False  35  False  False  False  38  False  False  False  False  38  False  False  40  False  False  False  False  40  False  40  False  False  False  False  41 |
| **Вход** | **Изход** |
| 612  value 993 710  contains 471 202  add 498 515 479  add 218 77 278  value 262 231  add 980 386 570  add 937 494 970  count  add 61 699 389  count  count  add 523 27 154  value 441 562  value 168 284  count  add 63 509 450  add 261 687 217  count  add 855 876 852  add 216 770 215  add 123 799 125  add 879 84 553  count  contains 453 790  contains 183 217  count  contains 740 430  count  value 34 799  add 171 932 196  count  contains 174 98  contains 670 347  contains 45 485  count  add 184 425 897  value 615 233  count  value 961 637  contains 329 315  value 309 409  add 323 787 953  add 683 806 906  add 547 861 119  count  contains 172 799  add 661 246 35  value 231 184  value 744 132  add 640 56 845  value 806 360  value 602 722  contains 412 891  contains 618 990  contains 67 372  count  contains 459 465  value 172 653  contains 274 501  value 138 9  add 54 447 165  value 230 764  add 758 342 898  count  add 743 770 745  count  value 505 116  count  count  contains 775 175  count  contains 129 266  add 436 755 583  contains 203 837  add 453 140 496  count  count  contains 178 560  add 688 429 883  value 857 583  count  add 603 773 442  contains 990 583  contains 635 788  contains 905 143  value 412 540  value 692 963  value 9 813  add 886 433 214  add 576 243 245  count  add 852 412 560  add 429 394 381  count  contains 938 668  contains 877 272  count  add 276 889 949  add 893 807 332  add 515 887 8  count  value 7 314  count  count  count  add 730 306 326  add 538 310 500  add 71 144 558  add 160 797 12  count  count  count  count  count  add 80 351 570  contains 385 923  contains 549 623  count  add 434 220 686  value 949 778  count  value 393 587  count  add 956 878 848  contains 817 706  value 93 946  add 7 650 954  value 567 152  count  value 669 447  value 345 574  value 110 170  count  contains 885 578  value 458 818  count  contains 664 537  count  value 843 663  add 267 326 212  add 887 193 211  count  count  contains 917 813  add 610 304 907  contains 647 355  count  add 367 166 549  value 666 141  value 615 123  add 826 784 680  add 247 727 73  count  add 363 626 174  count  contains 4 89  add 359 629 714  add 487 277 977  value 160 663  add 221 52 308  contains 280 472  add 29 517 531  add 180 475 365  add 21 581 192  value 8 827  contains 137 543  value 409 885  count  contains 702 178  add 63 869 61  add 55 983 893  value 449 975  contains 472 302  count  add 801 289 256  count  contains 409 655  count  contains 914 764  contains 871 586  value 522 814  count  value 116 606  count  add 965 597 298  value 559 851  add 665 240 535  add 83 49 250  count  count  contains 408 492  count  add 291 325 22  count  contains 453 758  add 333 333 632  count  add 290 798 408  contains 96 525  contains 249 523  add 700 502 702  count  contains 881 291  contains 114 887  value 674 271  count  count  value 398 245  contains 907 202  contains 585 853  value 507 62  add 312 966 776  value 767 203  count  value 994 181  count  add 41 624 517  contains 293 616  contains 132 154  add 126 394 703  contains 919 161  value 848 312  value 818 217  count  add 110 961 906  add 953 594 867  add 995 307 865  contains 20 974  contains 343 980  value 919 78  value 381 237  add 284 160 937  add 869 250 419  value 229 370  contains 332 709  count  add 560 366 909  count  count  value 341 140  value 288 968  add 888 297 317  count  contains 723 756  value 793 656  contains 347 744  value 40 348  contains 474 227  contains 521 751  count  contains 929 982  value 399 943  add 995 857 900  add 531 526 911  add 770 608 953  contains 385 903  contains 561 654  contains 710 992  count  count  add 334 497 136  value 605 378  contains 882 356  value 773 661  value 447 513  count  contains 436 588  contains 618 680  value 365 455  add 368 327 332  contains 950 529  contains 796 565  contains 394 587  count  contains 23 725  contains 835 612  add 779 114 141  add 196 555 901  value 441 654  contains 771 482  contains 10 419  contains 667 889  add 133 67 881  value 962 926  add 905 680 893  add 10 753 213  count  count  add 180 492 394  contains 764 354  value 81 623  add 768 673 603  add 928 945 368  add 711 233 361  add 269 425 996  add 548 570 642  add 269 249 756  add 369 175 495  contains 368 713  value 698 338  value 361 231  add 717 155 64  count  add 576 20 825  value 223 969  contains 681 806  count  count  contains 836 519  value 369 805  value 450 754  contains 998 263  contains 851 447  add 764 5 831  count  contains 633 165  contains 736 408  count  value 526 981  contains 907 627  count  contains 985 842  count  contains 911 401  contains 630 363  contains 756 162  add 775 905 868  contains 974 926  value 971 670  value 179 961  count  value 923 772  add 91 636 403  add 462 221 449  count  value 13 963  add 801 96 980  add 239 175 620  add 11 932 700  count  value 314 996  add 746 485 599  contains 857 310  count  add 759 22 313  contains 419 378  add 913 898 968  value 749 199  contains 187 626  count  contains 41 159  value 6 356  add 224 313 551  count  count  count  add 491 610 860  count  add 862 936 694  contains 877 787  count  value 445 247  value 29 297  value 388 198  count  count  add 753 666 165  count  add 826 620 499  contains 823 376  add 339 231 969  value 366 965  count  count  add 507 563 702  value 378 522  add 440 884 947  add 284 675 732  contains 697 476  contains 806 256  count  value 969 68  add 596 798 328  add 21 233 860  add 36 245 102  count  count  contains 304 484  add 741 875 153  value 663 498  count  add 890 376 601  add 860 635 593  contains 868 781  contains 808 230  value 713 363  add 639 487 448  add 993 861 502  value 228 130  add 915 254 932  count  value 144 131  value 258 17  add 609 509 829  contains 945 579  contains 829 879  add 789 612 24  add 969 830 896  contains 98 253  contains 505 499  contains 614 849  count  value 85 731  value 104 224  count  value 939 405  count  value 922 96  count  count  value 125 641  value 287 940  count  add 343 159 763  contains 103 9  add 999 96 154  value 744 147  count  contains 388 561  add 30 425 517  contains 175 157  add 254 567 593  value 940 137  value 771 497  contains 944 460  value 773 929  count  count  value 767 318  contains 103 626  count  count  count  add 909 889 716  contains 984 606  count  value 442 517  add 155 17 819  value 650 791  contains 928 642  count  add 130 138 776  count  value 579 151  value 152 718  contains 983 48  value 780 767  value 853 609  value 486 776  count  contains 750 499  contains 452 834  contains 325 704  value 807 758  contains 968 576  value 730 697  contains 364 308  contains 33 770  add 870 24 779  add 33 435 614  count  value 111 657  count  value 699 105  count  count  value 190 241  add 202 798 384  add 878 226 985  count  add 104 716 728  contains 582 810  value 250 670  count  add 405 791 857  value 429 833  value 395 911  value 670 843  contains 966 667  add 395 988 155  add 629 941 743  add 941 610 306  add 294 533 142  add 833 47 718  count  value 466 656  add 228 589 500  add 433 873 198  contains 914 585  contains 262 515  add 563 463 47  value 977 818  contains 881 100  count  value 451 10  count  add 256 284 928  count  add 980 39 441  contains 574 68  count  contains 202 709  add 880 704 684  count  count  count  add 489 838 517  count  count  add 356 981 862  contains 375 657  count  contains 931 405  add 523 22 432  count  value 406 845  contains 391 370  value 747 325  value 994 892  add 439 493 592  contains 551 319  count  contains 205 694  count  contains 408 411  value 298 517  value 231 931  value 580 431  contains 667 96  value 463 234  contains 719 381  value 108 156  count  value 533 972  contains 172 683  contains 712 538  add 983 959 943  count  value 37 762  value 378 859  add 919 966 454  contains 795 357  contains 974 925  value 300 255  contains 486 983  value 528 758  add 877 719 134  contains 113 791  contains 786 729  contains 618 803  contains 297 376  value 567 517  add 377 326 35  contains 612 353  contains 703 432  value 824 49  add 202 247 982  count  value 432 341  value 274 571  value 292 307  value 570 958  add 593 416 470  count  count  value 841 981  contains 180 430  add 88 824 905  contains 383 600  count  count  add 106 134 176  count  add 754 97 445  count  count  add 745 297 368  count  contains 841 822  count  add 360 264 251  value 689 185  contains 32 658  value 375 88  contains 100 487  count  count  add 277 50 743  contains 216 803  count  count  value 455 498  add 542 778 38  add 673 842 883  count  contains 917 6  add 786 381 1  add 102 197 880  add 285 805 544  count  count  value 47 447 | False  False  False  4  5  5  False  False  6  8  12  False  False  12  False  12  False  13  False  False  False  13  False  14  False  False  False  17  False  False  False  False  False  False  False  False  19  False  False  False  False  False  21  22  False  22  22  False  22  False  False  24  24  False  False  25  False  False  False  False  False  False  28  30  False  False  30  33  False  33  33  33  37  37  37  37  37  False  False  38  False  39  False  39  False  False  False  41  False  False  False  41  False  False  41  False  41  False  43  43  False  False  44  False  False  47  48  False  False  False  False  False  False  54  False  False  False  56  57  False  57  False  False  False  57  False  57  False  60  60  False  60  61  False  62  False  False  64  False  False  False  64  64  False  False  False  False  False  65  False  65  False  False  False  False  False  67  False  False  False  False  False  False  72  73  73  False  False  74  False  False  False  False  False  False  74  False  False  False  False  False  77  77  False  False  False  False  78  False  False  False  False  False  False  79  False  False  False  False  False  False  False  84  84  False  False  False  False  False  93  False  False  94  94  False  False  False  False  False  95  False  False  95  False  False  95  False  95  False  False  False  False  False  False  96  False  98  False  101  False  False  102  False  False  False  104  False  False  105  105  105  106  False  107  False  False  False  107  107  108  False  False  110  110  False  False  False  113  False  116  116  False  False  117  False  False  False  False  122  False  False  False  False  False  False  False  125  False  False  125  False  125  False  125  125  False  False  125  False  False  127  False  False  False  False  False  False  129  129  False  False  129  129  129  False  130  False  False  False  131  132  False  False  False  False  False  False  132  False  False  False  False  False  False  False  False  134  False  134  False  134  134  False  136  False  False  137  False  False  False  False  143  False  False  False  False  False  146  False  146  147  False  148  False  149  149  149  150  150  False  151  False  152  False  False  False  False  False  153  False  153  False  False  False  False  False  False  False  False  153  False  False  False  154  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  158  False  False  False  False  159  159  False  False  False  160  160  161  162  162  163  False  163  False  False  False  False  164  164  False  165  165  False  167  False  170  170  False |
| **Вход** | **Изход** |
| 483  count  add 632 61 258  count  add 541 974 686  value 729 566  count  add 48 286 560  count  count  value 633 615  contains 592 329  value 616 96  value 554 745  contains 268 916  add 518 598 496  contains 631 522  value 692 732  contains 685 430  contains 783 309  add 196 129 367  value 518 59  count  value 595 579  count  add 132 24 59  count  count  value 529 688  add 546 699 370  contains 923 839  value 643 334  add 313 442 316  contains 540 901  add 728 458 129  contains 121 51  add 706 559 708  contains 388 972  contains 253 620  add 649 429 997  add 595 220 578  count  count  count  add 779 815 474  contains 396 322  add 71 559 496  count  contains 292 996  count  add 246 254 362  count  add 822 142 900  add 903 59 133  add 550 281 860  contains 946 927  contains 233 123  value 650 613  add 60 677 223  value 704 80  add 88 331 30  value 121 71  value 673 574  count  count  count  value 832 9  add 564 92 345  add 619 897 123  count  contains 761 877  value 464 676  count  add 978 902 149  add 250 961 434  value 970 70  contains 715 499  count  contains 350 50  count  contains 689 359  add 612 191 208  value 186 359  add 194 209 898  add 293 283 59  contains 791 964  contains 657 469  add 549 238 407  value 324 108  contains 711 2  add 640 839 968  count  value 9 482  value 74 681  value 861 760  contains 206 103  contains 667 259  count  add 31 889 912  add 953 801 4  value 251 666  count  add 881 438 453  count  value 724 782  count  value 582 788  count  contains 477 769  contains 221 516  value 452 505  value 608 950  add 227 4 207  count  value 823 15  count  contains 879 198  value 787 823  value 476 15  add 449 101 589  count  count  add 446 640 734  value 30 701  value 830 503  count  contains 719 574  add 916 759 772  add 33 597 571  value 434 693  value 975 489  contains 158 848  count  value 528 175  add 272 88 209  count  value 959 368  add 527 280 223  value 11 310  contains 328 560  count  value 460 642  add 41 889 54  add 184 671 654  value 689 191  count  value 644 670  contains 765 80  contains 202 555  value 412 693  add 478 424 469  contains 906 512  contains 715 389  add 47 319 209  contains 775 696  contains 733 591  add 502 38 666  add 765 794 260  add 257 86 298  contains 196 980  contains 759 202  add 887 177 540  contains 583 577  contains 244 556  count  value 506 960  add 820 660 571  count  value 449 755  add 251 410 457  count  value 417 122  add 8 15 494  count  value 414 491  value 454 88  count  contains 238 920  count  value 126 124  value 536 409  count  add 752 378 776  value 130 226  count  value 205 121  count  count  value 11 498  count  count  add 752 985 669  add 234 872 330  add 705 175 643  contains 586 819  contains 13 741  add 70 489 361  contains 173 279  add 399 911 590  contains 739 628  value 403 367  contains 306 331  contains 144 903  contains 97 520  add 165 596 534  contains 615 834  count  count  count  value 806 160  value 390 862  value 961 740  contains 966 547  value 205 218  add 408 682 42  value 166 895  count  add 66 114 593  value 404 975  contains 469 211  contains 487 560  count  count  value 836 310  value 853 593  contains 558 319  count  count  count  add 151 227 478  add 21 542 89  contains 275 268  value 556 765  value 497 335  count  contains 658 667  value 741 206  contains 224 41  contains 516 508  value 201 548  add 768 543 241  contains 451 466  add 405 748 665  contains 340 385  add 784 57 223  add 673 657 676  count  count  add 851 865 979  value 573 237  count  add 421 496 996  count  count  contains 852 251  contains 261 165  add 638 287 838  value 886 458  count  value 528 891  count  count  add 219 881 586  count  add 832 511 184  contains 919 889  add 519 802 620  add 422 17 414  add 334 383 564  add 24 985 114  value 701 538  contains 112 519  add 35 721 265  value 494 429  contains 891 137  count  value 863 366  contains 664 616  add 874 969 351  value 836 317  contains 462 161  contains 558 482  value 389 777  contains 387 766  value 897 657  contains 985 471  count  add 196 77 161  contains 457 287  add 433 655 142  add 334 198 404  contains 302 333  contains 95 408  add 978 171 291  value 890 765  contains 448 351  value 880 354  contains 120 483  count  contains 260 271  count  contains 733 634  count  add 567 494 192  count  add 274 375 34  add 217 905 869  contains 566 521  count  value 304 158  count  value 607 283  add 1 790 450  value 11 646  add 536 888 927  count  count  contains 92 161  contains 504 319  contains 903 577  count  value 693 749  add 543 429 476  add 72 959 211  value 353 399  value 551 23  count  value 368 981  contains 244 250  value 892 142  count  value 661 87  count  contains 570 886  value 74 981  add 815 60 771  value 362 60  contains 739 762  value 952 296  add 930 208 449  add 449 499 189  contains 287 26  count  count  value 830 327  value 512 67  count  add 320 157 307  add 856 881 190  count  add 380 564 830  count  value 449 434  add 694 307 575  value 450 528  add 437 444 490  add 227 956 249  value 475 254  value 773 900  add 336 568 309  value 499 906  count  contains 46 883  count  value 661 818  value 901 250  value 629 273  value 411 391  value 57 195  add 746 355 110  add 676 534 881  count  contains 266 887  value 621 571  value 397 606  value 335 295  count  add 573 4 906  add 627 467 924  add 348 846 303  value 715 147  value 670 704  count  value 461 21  contains 362 918  add 702 837 14  value 111 721  value 699 689  value 105 306  contains 906 414  count  contains 917 40  contains 844 856  value 461 936  add 977 515 970  add 938 641 987  add 924 629 910  count  add 124 403 77  add 366 830 363  add 451 365 27  count  contains 322 271  add 846 50 552  value 967 743  count  contains 653 843  count  count  count  value 784 522  add 680 915 243  value 829 420  contains 572 972  contains 150 942  contains 220 319  contains 972 78  contains 358 543  count  count  add 348 372 522  count  add 774 469 580  contains 288 37  count  add 396 16 629  value 275 994  add 233 786 75  contains 145 601  count  value 204 164  contains 410 535  add 418 456 898  count  contains 198 57  contains 437 289  add 913 689 575  add 949 437 268  count  add 786 561 296  value 220 443  count  contains 375 340  contains 626 871  value 977 559  contains 654 748  value 159 663  count  value 439 232  value 848 840  count  contains 358 135  count  count  value 159 998  add 83 847 491  add 96 627 557  add 885 598 503  add 782 519 479  add 122 211 510  count  value 531 501  contains 120 613  count  count  count  count  add 399 733 608  contains 948 668  count  count  add 881 189 27  count  count  add 944 838 656  count  count  contains 649 537  add 551 346 765  add 483 323 66  contains 518 477  add 484 173 854  contains 335 653  value 350 579 | 0  1  False  2  3  3  False  False  False  False  False  False  False  False  False  False  5  False  5  6  6  False  False  False  False  False  False  False  12  12  12  False  14  False  14  15  False  False  False  False  False  False  20  20  20  False  22  False  False  22  False  False  24  False  24  False  False  False  False  False  False  29  False  False  False  False  False  29  False  31  32  False  32  False  32  False  False  False  False  33  False  33  False  False  False  34  34  False  False  35  False  False  False  False  37  False  38  False  False  False  39  False  False  41  False  False  False  False  False  False  False  False  False  False  False  False  47  False  48  False  49  False  50  False  False  50  False  50  False  False  50  False  51  False  51  51  False  51  51  False  False  False  False  False  False  False  False  False  57  57  57  False  False  False  False  False  False  58  False  False  False  59  59  False  False  False  59  59  59  False  False  False  61  False  False  False  False  False  False  False  65  65  False  66  67  67  False  False  False  68  False  68  68  69  False  False  False  False  False  75  False  False  False  False  False  False  False  False  False  76  False  False  False  False  False  False  False  80  False  80  False  80  81  False  83  False  83  False  False  85  85  False  False  False  85  False  False  False  87  False  False  False  87  False  87  False  False  False  False  False  False  90  90  False  False  90  92  93  False  False  False  False  False  97  False  97  False  False  False  False  False  99  False  False  False  False  99  False  False  102  False  False  False  False  False  False  103  False  False  False  106  109  False  False  110  False  110  110  110  False  False  False  False  False  False  False  111  111  112  False  113  False  False  115  False  False  116  False  False  118  False  119  False  False  False  False  False  119  False  False  119  False  119  119  False  124  False  False  124  124  124  124  False  125  125  126  126  127  127  False  False  False  False |
| **Вход** | **Изход** |
| 954  count  value 748 426  count  count  value 131 572  contains 151 616  contains 173 330  count  contains 527 485  value 750 942  add 888 626 649  add 726 727 1  add 952 412 78  add 431 90 525  contains 934 411  contains 554 35  value 131 586  contains 315 868  contains 529 406  value 798 542  value 860 800  contains 216 80  count  contains 418 198  add 542 77 898  add 29 936 550  count  add 387 990 42  count  add 563 410 858  count  contains 546 649  count  contains 474 230  contains 918 718  count  add 983 617 647  value 44 509  count  contains 530 592  value 312 609  add 967 817 304  contains 653 669  contains 129 755  contains 553 262  contains 423 7  count  add 832 119 31  count  count  count  contains 17 54  value 227 911  add 690 337 669  count  contains 413 421  count  add 661 612 854  value 995 374  value 985 993  contains 225 574  add 193 578 750  contains 422 737  contains 599 675  count  add 686 961 216  contains 124 916  contains 883 708  value 457 418  contains 511 398  add 236 68 0  contains 685 494  contains 143 91  contains 912 990  contains 717 465  value 294 637  add 34 158 188  value 76 29  count  value 256 736  add 201 83 23  contains 355 530  contains 713 531  add 293 72 501  count  add 603 199 991  count  count  add 912 336 364  add 47 207 924  contains 343 628  count  count  value 446 829  value 138 362  value 311 581  add 982 740 85  contains 384 71  count  add 875 954 264  add 288 746 659  contains 307 323  value 138 188  contains 882 665  contains 29 175  contains 60 629  count  add 542 806 353  contains 948 360  value 852 149  add 753 456 142  value 157 82  count  contains 54 611  contains 443 917  count  value 420 116  count  value 788 82  add 588 104 493  count  count  add 562 946 500  value 989 987  value 426 523  contains 872 92  count  count  contains 754 599  add 888 934 765  contains 244 468  value 360 117  contains 868 37  count  contains 689 269  add 107 111 662  count  value 607 431  value 442 482  value 458 648  contains 833 504  count  contains 457 271  add 702 32 942  contains 869 303  contains 485 272  add 402 60 367  count  contains 937 644  value 326 333  contains 801 985  add 901 468 836  add 533 6 81  add 998 31 405  add 720 825 59  count  value 411 169  count  count  count  count  add 189 566 750  contains 130 938  count  value 46 789  contains 401 467  contains 951 266  add 170 62 336  add 565 217 819  value 22 459  add 632 700 751  contains 187 631  value 966 256  count  add 59 628 504  add 930 98 658  value 351 459  value 170 230  count  value 142 624  count  value 735 108  count  add 267 346 38  add 213 835 677  value 9 667  add 2 707 556  contains 287 720  add 185 107 760  contains 530 520  add 243 489 221  contains 325 712  value 580 446  add 685 891 875  count  add 674 474 893  contains 160 333  add 586 90 62  add 495 922 371  count  contains 816 517  add 970 346 455  count  contains 955 76  count  count  count  value 395 845  value 183 433  count  value 27 360  value 6 902  add 555 115 216  add 209 24 698  value 373 820  count  contains 218 107  add 547 83 911  value 266 242  contains 364 700  contains 937 136  contains 789 157  add 963 443 325  value 569 738  add 212 236 620  value 22 25  count  contains 215 177  contains 480 276  value 30 636  value 888 750  contains 331 271  value 996 79  add 600 511 212  value 295 639  value 76 698  contains 645 263  contains 339 381  add 722 959 74  count  value 295 933  value 437 923  value 222 675  value 349 624  value 806 424  value 315 322  value 987 671  add 225 291 990  contains 244 411  add 120 549 928  value 771 335  count  contains 405 455  count  value 585 401  value 389 21  count  value 914 574  value 399 76  add 637 680 70  contains 816 813  contains 407 88  contains 391 420  contains 128 470  add 229 910 867  contains 167 85  value 467 901  value 259 406  count  contains 225 149  value 835 133  contains 234 935  contains 641 693  count  count  value 366 968  count  add 367 795 345  value 532 566  value 551 882  contains 740 847  contains 272 911  contains 330 241  contains 866 994  value 884 293  count  add 816 754 588  value 101 932  contains 23 39  contains 213 240  contains 284 916  contains 771 631  add 742 87 421  contains 967 515  add 399 453 241  contains 910 52  contains 306 750  add 962 929 501  value 197 530  add 210 315 90  contains 284 950  count  add 253 97 578  add 394 253 620  count  value 532 195  value 488 790  add 576 310 533  value 620 842  add 387 544 556  add 291 652 425  count  add 503 829 505  contains 954 85  add 356 911 341  count  contains 275 2  contains 744 419  add 513 314 750  add 791 202 124  contains 33 582  add 961 968 12  count  count  contains 952 982  add 206 490 142  add 840 278 350  contains 112 542  value 443 871  count  value 185 364  count  add 303 532 243  add 585 150 949  count  count  add 857 310 795  value 285 948  add 172 573 358  contains 851 520  contains 491 773  value 89 471  add 291 52 386  value 678 601  value 438 556  add 890 905 871  contains 254 231  add 681 586 548  value 12 791  value 525 452  add 645 560 812  count  value 901 378  value 804 923  value 82 683  value 585 615  contains 467 606  value 964 344  count  value 80 503  value 213 278  count  count  count  add 589 317 877  contains 639 30  add 492 798 449  count  add 598 902 562  count  count  add 479 919 472  add 301 300 51  count  count  value 164 478  contains 483 493  value 94 669  contains 871 906  count  contains 486 166  value 951 628  count  contains 360 911  value 15 960  count  value 542 16  contains 692 332  contains 25 327  count  value 824 638  contains 808 893  contains 525 339  add 316 985 880  count  count  count  value 756 618  count  contains 528 523  add 103 551 653  add 179 574 764  contains 158 846  value 127 990  contains 792 466  count  count  contains 918 152  value 661 609  add 269 506 916  count  add 724 377 300  contains 639 256  add 462 345 765  count  contains 826 34  count  add 432 86 963  add 935 238 852  contains 872 335  value 43 904  value 68 847  add 84 121 611  value 376 99  contains 225 855  add 910 640 411  value 627 192  add 836 419 953  count  add 485 525 695  contains 303 366  add 557 435 697  count  contains 742 912  value 395 55  value 426 926  add 227 941 964  count  count  count  value 899 73  contains 893 913  value 636 85  add 635 796 170  add 297 575 213  add 839 198 714  count  contains 780 432  contains 329 58  count  contains 730 280  value 103 345  contains 362 48  contains 658 796  count  contains 263 420  add 256 897 783  contains 728 753  contains 196 547  count  count  count  add 367 584 887  count  contains 400 354  value 66 682  contains 213 164  contains 181 401  count  contains 345 360  add 270 431 275  contains 855 977  contains 712 556  value 368 69  value 169 73  value 897 218  value 66 303  add 214 143 438  contains 78 439  value 108 800  value 932 975  add 152 612 772  contains 423 694  add 510 802 271  add 333 505 107  count  contains 447 482  count  value 81 217  add 166 291 898  add 917 447 80  count  add 856 72 921  count  add 570 439 372  add 678 412 872  count  add 573 331 302  contains 352 461  contains 36 15  value 481 606  count  contains 473 257  add 722 847 6  count  count  add 196 416 876  add 921 809 402  value 258 871  add 325 889 615  value 727 962  count  value 56 985  value 518 215  value 898 871  contains 690 25  count  value 139 144  add 151 476 417  contains 226 613  add 222 734 294  add 584 641 183  value 884 507  contains 376 200  count  value 661 128  add 938 786 114  add 582 307 185  contains 509 727  count  contains 782 592  count  value 591 784  value 715 314  add 431 695 140  value 97 763  value 723 254  value 289 693  count  value 15 989  add 986 13 839  add 456 742 339  contains 63 932  count  value 113 740  count  contains 708 355  count  add 800 210 422  value 785 473  count  count  add 304 617 840  contains 632 934  contains 474 97  value 952 800  add 33 830 598  value 141 74  value 985 579  count  contains 897 350  value 590 38  count  value 306 84  contains 759 315  contains 187 480  value 711 233  contains 379 466  count  contains 176 592  add 852 331 361  count  add 724 145 244  contains 282 157  add 436 751 992  contains 716 420  count  contains 94 746  contains 268 164  value 968 91  add 605 606 600  value 836 493  contains 944 705  contains 34 170  count  count  add 648 600 797  value 386 819  contains 323 902  add 108 105 670  add 214 351 756  add 114 99 675  contains 112 599  count  count  contains 11 887  add 344 834 263  count  contains 564 953  add 705 310 30  count  contains 921 728  count  value 852 490  add 278 116 144  count  contains 92 488  add 601 44 117  contains 435 662  contains 273 842  add 472 650 398  contains 348 804  add 392 858 190  value 870 362  value 520 706  value 228 689  value 940 528  add 755 507 661  add 466 847 36  add 454 545 771  count  value 782 630  value 339 314  add 233 297 325  contains 681 267  add 729 700 505  contains 961 267  value 573 642  add 687 612 601  contains 822 2  count  count  contains 470 680  value 330 460  count  contains 810 294  value 429 776  value 924 422  add 335 682 870  contains 504 434  count  add 491 80 727  contains 585 411  count  value 406 91  value 363 805  count  add 233 396 456  contains 794 213  count  contains 688 178  count  count  count  contains 740 85  add 413 783 839  count  contains 852 225  value 484 521  count  value 126 59  count  value 638 636  add 47 784 471  value 127 372  add 533 158 925  value 361 665  add 761 950 22  contains 664 610  contains 231 767  count  contains 993 820  contains 119 115  contains 681 910  contains 37 251  value 856 711  add 583 318 67  value 510 159  contains 881 365  add 289 436 973  add 643 816 16  add 235 133 552  count  count  add 404 292 451  add 968 510 8  add 817 657 27  add 164 810 799  contains 290 938  add 10 825 84  contains 884 909  add 234 780 621  contains 454 105  value 24 552  add 708 591 913  value 101 124  contains 315 998  count  contains 206 361  contains 843 614  count  count  add 320 583 567  add 746 276 227  contains 239 203  value 319 140  count  contains 823 698  add 341 909 701  count  count  value 490 569  add 418 918 734  value 822 500  value 231 634  add 388 167 578  value 580 378  add 75 99 511  value 779 880  add 590 940 494  contains 855 189  contains 712 177  add 809 624 505  count  add 819 333 26  value 681 309  value 763 35  add 87 282 809  count  add 78 638 38  contains 249 882  add 290 376 444  count  contains 990 329  add 955 873 747  value 280 177  value 832 198  value 733 177  count  count  value 907 871  count  add 170 170 586  value 114 217  value 43 649  contains 221 633  value 434 971  add 214 534 833  add 880 154 805  value 754 516  contains 547 895  contains 537 588  count  value 158 893  count  value 633 758  count  add 273 330 977  add 866 742 487  add 553 373 38  add 238 15 364  contains 160 597  contains 266 147  add 965 632 277  value 276 78  value 255 900  add 642 745 881  count  value 553 650  value 59 665  add 164 550 143  contains 142 528  contains 798 36  add 201 986 232  count  count  value 870 466  count  count  count  count  value 568 493  add 889 883 607  value 551 206  count  value 801 81  add 363 133 549  add 457 864 828  count  value 648 110  contains 629 779  count  contains 230 757  contains 587 574  add 7 639 739  add 88 694 995  contains 247 564  count  value 507 332  value 262 839  contains 135 127  contains 486 778  count  value 168 56  contains 252 227  add 493 559 224  add 910 432 266  value 133 445  count  count  contains 253 839  count  add 791 967 917  add 451 446 403  contains 860 373  add 920 638 439  count  add 454 769 230  count  add 949 829 573  value 2 682  count  add 232 112 138  value 894 763  count  count  add 41 112 821  contains 49 59  add 854 494 5  add 381 92 483  contains 989 955  value 138 344  add 449 764 923  count  contains 260 74  add 744 676 967  contains 427 727  add 461 601 899  value 519 978  contains 676 477  contains 140 628  contains 905 939  value 146 965  value 592 347  value 169 421  value 979 829  value 329 35  contains 664 755  count  contains 353 942  count  value 271 942  add 445 730 487  contains 545 119  value 754 820  contains 649 135  value 563 431  count  value 539 148  value 346 441  add 475 873 37  count  contains 978 779  add 505 650 259  count  count  value 166 434  contains 944 574  add 928 14 619  contains 965 921  count  count  count  add 184 741 3  contains 12 758  contains 742 219  value 41 603  add 485 510 110  value 544 805  add 437 812 771  add 104 460 253  count  count  contains 514 383  value 381 465  contains 448 741  value 407 927  value 724 798  add 324 870 134  add 854 929 919  contains 180 686  count  value 777 593  contains 505 190  count  contains 261 657  contains 763 20  value 662 251  contains 397 178  count  add 973 52 780  contains 119 105  contains 734 594  value 674 694  add 547 670 147  count  value 736 638  add 537 516 575  add 113 217 192  contains 296 192  add 218 283 996  contains 812 961  count  add 773 822 667  value 74 68  value 445 991  add 253 495 441  value 919 435  contains 205 483  add 887 364 56  count  contains 672 476  value 551 946  count  count  contains 651 864  count  value 652 500  add 187 772 200  contains 43 696  contains 387 364  contains 188 607  count  count  add 408 765 369  count  count  contains 116 894  add 769 844 979  value 965 573  contains 884 705  count  value 114 164  count  count  value 112 88  count  value 757 727  value 134 453  count  contains 500 390  add 446 70 878  add 804 198 717  value 422 790 | 0  False  0  0  False  False  False  0  False  False  False  False  False  False  False  False  False  False  4  False  6  7  8  False  8  False  False  8  False  9  False  False  False  False  False  False  10  11  11  11  False  False  12  False  12  False  False  False  False  False  14  False  False  False  False  False  False  False  False  False  False  17  False  False  False  19  20  20  False  22  22  False  False  False  False  23  False  False  False  False  False  25  False  False  False  27  False  False  27  False  27  False  28  28  False  False  False  29  29  False  False  False  False  30  False  31  False  False  False  False  31  False  False  False  33  False  False  False  37  False  37  37  37  37  False  38  False  False  False  False  False  False  41  False  False  43  False  43  False  43  False  False  False  False  False  49  False  52  False  53  False  53  53  53  False  False  53  False  False  False  55  False  False  False  False  False  False  False  58  False  False  False  False  False  False  False  False  False  False  60  False  False  False  False  False  False  False  False  False  62  False  62  False  False  62  False  False  False  False  False  False  False  False  False  64  False  False  False  False  64  64  False  64  False  False  False  False  False  False  False  65  False  False  False  False  False  False  False  False  False  False  70  72  False  False  False  75  False  77  False  False  False  80  80  False  False  False  82  False  82  84  84  False  False  False  False  False  False  False  False  False  90  False  False  False  False  False  False  90  False  False  90  90  90  False  92  93  93  95  95  False  False  False  False  95  False  False  95  False  False  95  False  False  False  95  False  False  False  96  96  96  False  96  False  False  False  False  98  98  False  False  99  False  101  False  101  False  False  False  False  False  False  106  False  108  False  False  False  109  109  109  False  False  False  112  False  False  112  False  False  False  False  112  False  False  False  113  113  113  114  False  False  False  False  114  False  False  False  False  False  False  False  False  False  False  False  119  False  119  False  121  122  124  False  False  False  125  False  126  126  False  False  129  False  False  False  False  129  False  False  False  False  132  False  False  134  False  134  False  False  False  False  False  135  False  False  137  False  137  False  137  False  138  138  False  False  False  False  False  140  False  False  140  False  False  False  False  False  140  False  141  False  False  143  False  False  False  False  False  False  144  144  False  False  False  148  148  False  149  False  150  False  150  False  151  False  False  False  False  False  False  False  False  157  False  False  False  False  False  False  160  160  False  False  160  False  False  False  False  161  False  162  False  False  162  False  163  False  163  163  163  False  164  False  False  164  False  164  False  False  False  False  False  167  False  False  False  False  False  False  False  171  171  False  False  False  False  False  False  178  False  False  178  178  False  False  180  False  181  181  False  False  False  False  False  False  False  186  False  False  188  False  190  False  False  False  False  191  191  False  191  False  False  False  False  False  False  False  194  False  194  False  194  False  False  False  False  200  False  False  False  False  202  202  False  202  202  202  202  False  False  203  False  205  False  False  205  False  False  False  207  False  False  False  False  207  False  False  False  209  209  False  209  False  212  213  False  214  False  215  215  False  False  False  219  False  False  False  False  False  False  False  False  False  False  False  False  221  False  221  False  False  False  False  False  222  False  False  223  False  224  224  False  False  False  225  225  225  False  False  False  False  229  229  False  False  False  False  False  False  231  False  False  231  False  False  False  False  231  False  False  False  233  False  False  False  236  False  False  False  False  239  False  False  239  239  False  239  False  False  False  False  240  240  241  241  False  False  False  242  False  242  242  False  242  False  False  242  False  False |
| **Вход** | **Изход** |
| 1000  count  value 936 650  add 684 375 202  count  value 614 380  count  add 178 388 797  count  add 452 278 1  contains 808 530  add 958 260 188  add 971 803 35  contains 858 314  add 41 252 22  add 559 464 900  value 335 853  contains 936 808  contains 434 175  add 700 481 210  add 120 838 725  add 13 177 783  value 345 796  count  value 336 755  add 156 227 718  contains 722 844  add 347 450 323  count  count  contains 628 829  value 377 103  value 920 413  count  add 546 286 117  add 989 56 132  add 472 943 265  add 978 981 944  count  count  value 490 275  value 633 691  add 182 515 885  value 761 411  value 755 860  add 172 250 605  contains 205 290  count  count  value 542 272  contains 851 929  count  contains 641 995  value 20 318  value 595 871  value 474 171  add 310 61 108  contains 158 861  value 693 883  contains 720 200  value 539 726  add 973 573 664  value 565 146  value 839 831  value 799 258  contains 733 718  contains 119 183  value 845 434  value 451 989  add 739 731 47  count  contains 63 778  add 445 898 398  value 214 569  add 291 268 678  count  add 550 38 149  value 989 80  value 597 880  contains 211 121  contains 836 825  count  contains 565 108  value 20 71  add 835 320 920  value 614 778  contains 166 84  add 927 569 700  contains 173 284  contains 288 180  count  contains 686 276  add 377 743 748  contains 702 569  contains 41 478  value 314 554  add 175 160 819  count  contains 127 988  contains 267 124  value 548 280  count  count  value 764 478  add 44 784 527  value 29 983  count  contains 590 885  add 871 267 618  add 466 128 361  value 181 559  count  count  add 618 916 21  count  add 54 201 713  count  add 510 285 648  count  value 343 85  contains 398 860  add 253 564 930  add 999 359 478  value 297 588  value 394 417  count  add 962 41 411  contains 684 377  contains 101 108  value 818 837  contains 636 96  value 889 528  value 365 351  add 355 104 694  contains 928 52  contains 753 891  add 38 675 381  add 201 861 176  value 732 462  value 136 180  contains 905 148  add 641 867 865  count  value 761 871  contains 306 842  value 448 468  contains 354 37  contains 799 896  count  add 745 27 352  add 633 888 269  add 923 172 817  value 852 936  value 25 746  add 913 509 357  value 19 216  count  count  value 466 99  contains 722 9  value 147 895  value 513 350  count  value 601 467  count  contains 142 669  contains 588 469  add 841 646 982  contains 696 851  add 136 783 369  value 802 119  count  count  value 885 704  add 45 512 396  value 41 908  value 511 349  add 681 647 349  value 87 750  add 26 148 451  add 831 377 566  value 922 799  count  add 220 334 783  value 547 423  count  count  contains 941 836  value 340 659  add 102 721 601  value 32 581  count  value 737 253  value 213 135  value 16 119  add 541 459 128  contains 897 735  value 573 587  count  count  add 311 645 703  add 314 464 161  count  value 315 470  value 551 46  contains 550 210  count  contains 730 822  contains 264 880  contains 323 204  value 799 231  count  count  add 697 426 607  count  add 821 365 854  value 115 226  value 281 187  value 77 251  count  add 688 599 261  contains 380 822  contains 990 259  add 521 762 870  add 804 853 620  add 256 169 542  count  value 24 612  add 890 249 136  count  value 548 867  add 587 444 436  value 227 470  count  value 105 679  count  count  count  value 476 333  add 26 994 194  contains 438 723  add 971 342 932  count  value 906 267  value 894 648  contains 360 417  value 823 786  value 711 145  add 747 259 681  add 772 802 122  value 554 673  contains 149 720  add 871 884 538  add 976 199 411  count  count  contains 189 116  value 453 203  add 423 969 293  contains 490 711  contains 837 620  add 784 385 418  add 108 456 639  add 906 938 247  value 735 945  value 443 801  value 904 656  value 668 678  count  count  contains 856 193  contains 160 223  contains 384 925  count  add 885 236 598  contains 476 696  contains 265 961  contains 234 347  contains 46 909  contains 932 964  add 115 707 72  value 537 600  count  contains 746 714  contains 381 810  contains 757 557  contains 374 171  add 190 121 413  count  contains 336 509  count  contains 250 535  value 420 760  count  count  value 266 61  add 30 185 801  contains 415 276  count  value 985 489  count  count  value 785 974  value 293 687  count  add 91 996 849  count  add 776 961 50  add 438 743 298  count  add 149 4 320  value 969 317  value 691 465  add 906 222 8  contains 785 304  add 126 888 859  add 34 336 305  count  contains 314 373  contains 546 745  add 999 722 636  value 674 430  contains 60 288  count  contains 677 589  value 767 325  count  value 412 617  count  count  value 114 667  add 491 330 2  contains 105 918  count  value 223 285  value 814 630  contains 408 828  contains 643 502  contains 716 414  value 988 109  contains 134 127  contains 545 726  contains 302 660  value 387 58  contains 294 612  count  contains 733 481  count  count  count  value 208 581  value 352 612  add 298 76 458  add 429 444 784  count  add 677 559 477  contains 969 655  add 769 820 349  value 407 987  contains 389 662  contains 365 316  value 54 662  count  value 294 362  value 928 45  count  value 828 953  contains 55 922  value 938 325  add 187 811 61  add 721 601 310  count  add 351 770 78  count  count  add 14 185 568  add 607 792 92  contains 500 499  add 454 483 625  count  value 719 39  add 731 242 600  count  add 693 51 466  value 694 549  value 360 573  count  add 736 280 721  contains 369 94  add 561 504 660  add 826 769 601  contains 50 39  count  contains 928 414  value 381 524  contains 326 232  add 951 728 701  value 150 584  contains 533 998  count  value 636 154  add 865 527 546  add 696 259 156  count  contains 45 926  count  contains 921 898  add 162 43 862  add 610 776 958  count  contains 185 870  add 52 717 531  add 774 374 950  value 977 330  contains 973 874  count  value 655 954  contains 957 809  contains 801 159  contains 774 97  count  add 568 281 549  contains 388 151  count  add 514 915 630  count  value 43 219  value 414 889  add 157 780 303  count  value 228 61  count  count  contains 791 236  contains 945 862  count  contains 781 117  contains 722 6  value 141 39  add 704 838 590  contains 328 325  value 914 271  count  count  value 620 283  count  value 195 456  contains 678 953  count  add 757 523 50  count  count  count  add 798 162 271  value 523 222  value 668 229  count  count  value 673 554  add 725 160 834  count  value 811 525  count  count  add 397 730 833  add 278 28 580  count  add 509 102 699  value 759 104  add 526 227 256  count  add 633 554 736  value 889 461  add 517 339 273  contains 910 650  add 492 946 610  value 437 771  count  contains 44 918  add 353 75 152  value 284 298  add 34 971 764  add 96 260 388  contains 532 936  value 236 358  value 157 634  contains 55 915  count  value 554 883  add 509 817 771  contains 386 895  contains 54 974  contains 876 678  count  count  value 350 563  value 239 371  value 807 560  add 196 440 539  value 369 22  count  count  add 684 666 279  count  value 180 637  count  contains 261 775  value 478 273  count  add 565 712 949  count  contains 308 702  count  contains 340 945  count  contains 685 952  add 397 591 676  contains 569 861  contains 689 602  add 45 545 785  count  contains 166 243  contains 803 309  count  add 575 376 963  add 955 511 235  count  contains 40 309  contains 514 887  contains 647 635  contains 1 260  contains 500 262  add 472 206 622  value 112 11  value 642 849  add 16 300 686  contains 906 199  count  count  count  add 235 250 812  value 569 595  add 100 308 131  count  add 113 806 550  contains 889 456  add 655 159 667  contains 281 870  count  value 88 797  value 806 393  add 257 921 221  count  value 209 516  value 781 333  contains 782 941  add 879 997 157  count  value 150 688  value 568 565  contains 959 271  contains 955 302  contains 325 57  value 855 885  count  count  add 246 653 687  count  count  value 498 929  add 81 91 639  count  value 243 468  count  count  contains 864 831  value 881 12  count  value 392 725  add 331 993 668  value 212 750  count  add 467 234 598  add 30 160 553  value 662 15  contains 814 448  count  contains 673 489  count  count  value 675 899  contains 575 773  value 779 88  count  value 278 59  contains 468 943  add 57 831 800  value 328 148  value 811 876  value 576 887  count  value 314 946  count  contains 325 568  contains 23 258  add 380 464 441  value 736 456  add 980 499 415  contains 657 465  contains 443 526  add 694 698 862  count  value 628 428  contains 331 617  add 142 375 389  add 573 674 397  value 706 988  add 420 842 596  count  add 377 656 481  value 280 798  count  add 325 395 798  count  value 12 305  count  value 46 837  add 26 582 84  value 133 580  value 94 619  count  add 731 505 583  add 864 850 706  contains 343 890  count  contains 177 875  value 26 694  contains 669 581  value 758 263  add 794 572 690  value 700 978  count  count  add 375 67 982  count  value 440 554  add 305 493 233  contains 874 907  value 223 553  add 411 949 696  add 972 242 565  count  count  add 928 40 365  contains 941 661  value 808 927  value 732 243  add 448 490 265  add 347 920 665  value 555 147  value 978 463  count  add 94 739 687  contains 147 395  add 265 128 732  contains 213 105  add 295 779 393  add 834 247 734  contains 212 218  count  contains 384 372  value 512 523  count  count  contains 713 187  add 27 95 719  add 224 137 297  contains 707 560  contains 259 368  count  value 629 103  count  count  contains 469 368  contains 10 831  count  contains 208 251  value 454 393  add 692 365 73  add 3 509 570  value 599 629  add 716 113 524  add 713 848 206  add 326 660 616  contains 575 708  count  value 521 88  count  value 105 275  add 675 94 736  contains 99 907  value 612 869  contains 452 294  contains 848 563  count  count  contains 220 66  count  add 705 497 406  contains 658 48  value 233 825  value 440 960  value 958 976  count  add 326 508 48  contains 920 123  count  contains 2 957  contains 963 106  value 208 705  contains 388 239  add 508 248 768  value 636 913  count  value 757 999  contains 518 68  contains 893 558  count  count  value 374 992  value 656 91  add 269 718 76  add 255 249 569  contains 227 598  add 739 262 111  add 632 560 935  add 352 74 895  contains 991 649  count  count  contains 864 115  contains 591 677  contains 366 194  count  contains 502 749  add 780 840 992  value 818 135  add 777 741 431  value 653 738  add 374 202 84  contains 947 979  value 872 112  value 486 62  contains 744 812  add 939 433 252  count  count  add 524 175 831  add 52 826 123  contains 647 937  value 394 991  value 328 38  contains 770 70  value 728 3  count  value 425 473  value 522 492  contains 401 421  value 319 677  value 751 775  value 138 749  count  count  contains 122 315  value 819 890  value 878 482  add 386 325 520  value 75 746  contains 861 601  add 117 536 518  contains 672 315  count  count  value 843 932  add 299 662 781  contains 110 720  add 631 591 650  value 174 477  value 157 62  contains 29 346  count  add 238 223 11  contains 784 80  contains 470 614  add 638 314 227  add 858 65 441  contains 859 715  value 599 467  contains 343 52  contains 157 357  contains 749 496  contains 11 61  count  value 28 325  contains 641 161  value 550 279  value 250 967  count  value 234 392  count  contains 177 638  value 392 261  contains 402 346  add 5 350 141  contains 216 964  count  count  count  count  add 74 808 622  value 338 482  value 710 858  count  count  count  add 93 833 422  contains 376 766  contains 236 294  add 971 199 138  add 34 3 880  contains 821 81  count  count  count  add 838 54 779  value 692 488  value 630 994  add 565 382 542  contains 919 646  contains 982 779  value 651 717  add 280 768 707  value 658 552  count  contains 606 464  count  value 322 987  contains 544 806  count  count  add 6 636 651  count  add 782 175 363  count  contains 609 364  add 854 499 161  value 510 94  add 719 390 958  value 135 891  contains 658 54  count  value 464 311  contains 194 643  add 245 833 876  count  value 456 899  value 41 723  count  count  contains 559 295  add 262 484 615  contains 732 325  count  add 517 308 846  contains 144 53  contains 659 855  add 739 676 217  contains 808 934  add 64 93 167  add 169 553 878  contains 263 48  add 578 965 384  value 581 691  value 602 609  add 709 988 115  value 632 456  value 619 983  contains 676 681  contains 668 231  add 56 347 755  value 55 881  add 579 80 890  contains 818 95  contains 840 206  count  value 354 105  add 320 537 96  add 58 279 486  count  value 346 716  contains 496 634  contains 847 641  add 828 983 536  contains 742 797  add 523 458 721  count  count  contains 313 125  add 736 810 658  value 996 602  contains 227 183  contains 943 129  contains 890 327  count  contains 781 526  add 515 592 794  count  add 534 821 765  value 540 620  count  contains 463 898  contains 188 732  add 226 465 309  contains 197 854  value 924 567  count  add 673 944 787  add 516 143 15  count  value 461 780  value 344 642  value 539 566  add 992 625 170  value 667 300  contains 206 48  contains 445 187  contains 253 372  value 867 676  contains 559 946  value 687 828  value 653 445  contains 964 901  count  count  count  value 575 768  value 723 276  count  count  count  add 417 914 662  value 527 380  contains 775 248  value 6 188  add 937 341 67  add 854 943 242  add 324 131 882  value 678 604  value 143 399  add 211 636 659  count  value 220 802  value 332 391  add 24 390 297  contains 338 830  contains 655 263  contains 404 68  value 93 783  value 30 848  value 740 631  value 795 795  contains 577 667  count  value 211 937  contains 850 19  count  contains 584 220  count  value 233 487  add 496 807 568  contains 176 131  count  value 69 557  contains 495 174  contains 502 48  value 162 171  value 51 694  value 218 928  value 42 194  value 508 2  contains 143 713  count  value 983 866  count  count  count  count  value 53 198  contains 125 145  add 171 578 610  add 679 84 801 | 0  False  1  False  1  2  False  False  False  False  False  False  10  False  False  12  12  False  False  False  12  16  16  False  False  False  False  False  18  18  False  False  18  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  21  False  False  23  False  False  False  False  24  False  False  False  False  False  False  26  False  False  False  False  28  False  False  False  28  28  False  False  29  False  False  31  31  32  33  34  False  False  False  False  36  False  False  False  False  False  False  False  False  False  False  False  41  False  False  False  False  False  41  False  False  False  45  45  False  False  False  False  45  False  45  False  False  False  False  47  47  False  False  False  False  False  51  False  52  52  False  False  False  53  False  False  False  False  False  54  54  56  False  False  False  56  False  False  False  False  56  56  57  False  False  False  58  False  False  62  False  63  False  False  64  False  64  64  64  False  False  66  False  False  False  False  False  False  False  70  70  False  False  False  False  False  False  False  False  74  74  False  False  False  74  False  False  False  False  False  False  76  False  False  False  False  77  False  77  False  False  77  77  False  False  78  False  78  78  False  False  78  79  81  False  False  False  85  False  False  False  False  86  False  False  86  False  86  86  False  False  87  False  False  False  False  False  False  False  False  False  False  False  87  False  87  87  87  False  False  89  False  False  False  False  False  91  False  False  91  False  False  False  93  94  94  False  97  False  98  False  False  99  False  False  102  False  False  False  False  False  103  False  105  False  105  False  107  False  False  False  109  False  False  False  False  109  False  110  111  False  False  112  False  112  112  False  False  112  False  False  False  False  False  113  113  False  113  False  False  113  114  114  114  False  False  115  115  False  116  False  116  116  118  False  120  False  False  False  123  False  False  False  False  False  False  126  False  False  False  False  127  127  False  False  False  False  128  128  129  False  129  False  False  129  130  False  130  False  130  False  False  False  132  False  False  132  134  False  False  False  False  False  False  False  False  136  136  136  False  138  False  False  140  False  False  141  False  False  False  142  False  False  False  False  False  False  142  142  143  143  False  144  False  144  144  False  False  144  False  False  145  False  False  147  False  147  147  False  False  False  147  False  False  False  False  False  148  False  148  False  False  False  False  False  151  False  False  False  154  False  155  156  False  156  False  False  False  157  False  159  False  False  False  False  False  160  160  161  False  False  False  164  164  False  False  False  False  False  167  False  False  False  171  False  False  171  171  False  False  False  173  False  173  173  False  False  173  False  False  False  False  178  False  178  False  False  False  False  False  179  179  False  179  False  False  False  False  180  False  181  False  False  False  False  False  182  False  False  False  182  182  False  False  False  False  187  187  False  False  False  187  False  False  False  False  False  False  False  191  191  False  False  False  False  False  193  False  False  False  False  False  False  193  193  False  False  False  False  False  False  195  195  False  False  False  False  False  197  False  False  False  False  False  False  False  False  200  False  False  False  False  200  False  200  False  False  False  False  201  201  201  201  False  False  202  202  202  False  False  False  205  205  205  False  False  False  False  False  False  208  False  208  False  False  208  208  209  210  False  False  False  False  212  False  False  213  False  False  213  213  False  False  214  False  False  False  False  False  False  False  False  False  False  False  False  False  222  False  224  False  False  False  False  226  226  False  False  False  False  False  227  False  228  False  229  False  False  False  False  230  232  False  False  False  False  False  False  False  False  False  False  False  False  233  233  233  False  False  233  233  233  False  False  False  False  False  238  False  False  False  False  False  False  False  False  False  False  239  False  False  239  False  239  False  False  240  False  False  False  False  False  False  False  False  False  240  False  240  240  240  240  False  False |
| Задача 6. MultiDictionary | |
| **Условие**  Реализирайте хеш-таблица, която позволява по даден ключ да съхраняваме повече от една стойност.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху хеш-талица, която съдържа целочислени ключове и стойности. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add k v –добавя запис в хеш-таблицата, като k е ключът, а v - стойността. Ако хеш-таблицата вече съдържа такъв запис, на екрана се изписва "False" на нов ред.  count – изписва на екрана съобщение "c", където c е броят записи в хеш-таблицата.  contains k – ако хеш-таблица съдържа запис с ключ k, на екрана се изписва съобщение "True". В противен случай на екрана се изписва съобщение "False".  values k– печата на конзолата стойностите, които отговарят в хеш-таблицата на ключа k на един ред, разделени с интервал, сортирани в нарастващ ред. Ако записът не се съдържа в таблицата, на екрана се изписва "False" на нов ред.  Пример:  10  add 1 2  add 1 3  add 1 2  add 1 4  add 2 3  count  values 1  contains 5  contains 1  values 2  Резултат:  False  2  2 3 4  False  True  3 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  Използвайте Dictionary<int, HashSet<int>>, за да разбирате бързо дали даден запис е вече добавен. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Text;  class MultiDictionary<K, V>  {  private Dictionary<K, HashSet<V>> container;  public int Count  {  get  {  return this.container.Count;  }  }  public MultiDictionary()  {  this.container = new Dictionary<K, HashSet<V>>();  }  public bool Add(K key, V value)  {  HashSet<V> values;  bool containsKey = this.container.TryGetValue(key, out values);  if (!containsKey)  {  values = new HashSet<V>();  values.Add(value);  this.container.Add(key, values);  return true;  }  else  {  bool isAddingSuccessful = values.Add(value);  return isAddingSuccessful;  }  }  public bool Contains(K key)  {  bool containsKey = this.container.ContainsKey(key);  return containsKey;  }  public HashSet<V> Values(K key)  {  HashSet<V> values;  bool containsKey = this.container.TryGetValue(key, out values);  if (!containsKey)  {  values = new HashSet<V>();  }  return values;  }  }  class CommnadExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  MultiDictionary<int, int> dict = new MultiDictionary<int, int>();  ExecuteCommands(dict);  Console.WriteLine(output.ToString().Trim());  }  private static void ExecuteCommands(MultiDictionary<int, int> dict)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, dict);  }  }  private static void ExecuteCommands(string command, MultiDictionary<int, int> dict)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, dict);  break;  case "count":  ExecuteCountCommand(dict);  break;  case "contains":  ExecuteContainsCommand(tokens, dict);  break;  case "values":  ExecuteValuesCommand(tokens, dict);  break;  default:  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteValuesCommand(string[] tokens, MultiDictionary<int, int> dict)  {  int key = int.Parse(tokens[1]);  HashSet<int> values = dict.Values(key);  SortedSet<int> sortedValues = new SortedSet<int>();  foreach (var item in values)  {  sortedValues.Add(item);  }  StringBuilder buffer = new StringBuilder();  foreach (var item in sortedValues)  {  buffer.AppendFormat("{0} ", item);  }  PrintLine(buffer.ToString());  }  private static void ExecuteAddCommand(string[] tokens, MultiDictionary<int, int> dict)  {  int key = int.Parse(tokens[1]);  int value = int.Parse(tokens[2]);  bool isCommandSuccessful = dict.Add(key, value);  if (!isCommandSuccessful)  {  PrintLine(isCommandSuccessful.ToString());  }  }  private static void ExecuteCountCommand(MultiDictionary<int, int> dict)  {  int count = dict.Count;  PrintLine(count.ToString());  }  private static void ExecuteContainsCommand(string[] tokens, MultiDictionary<int, int> dict)  {  int key = int.Parse(tokens[1]);  bool contains = dict.Contains(key);  PrintLine(contains.ToString());  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 10  add 1 2  add 1 3  add 1 2  add 1 4  add 2 3  count  values 1  contains 5  contains 1  values 2 | False  2  2 3 4  False  True  3 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 936  add 98 27  add 69 82  add 22 66  add 58 90  add 23 49  add 87 83  add 80 30  add 62 92  add 75 85  add 26 91  add 24 86  add 71 48  add 51 98  add 78 85  add 29 53  add 13 44  add 85 63  add 20 53  add 64 45  add 58 93  add 56 96  add 92 44  add 28 52  add 85 46  add 91 11  add 29 42  add 48 72  add 75 41  add 82 14  add 17 16  add 99 92  add 80 32  add 85 37  add 58 85  add 67 99  add 84 28  add 25 44  add 85 20  add 56 80  add 46 19  add 71 20  add 97 86  add 78 21  add 56 44  add 40 90  add 58 18  add 22 98  add 91 92  add 99 23  add 84 33  add 34 48  add 79 87  add 57 69  add 71 15  add 72 69  add 98 54  add 43 98  add 32 34  add 54 79  add 72 98  add 72 93  add 36 31  add 86 61  add 22 11  add 29 50  add 77 28  add 72 10  add 61 51  add 80 12  add 17 34  add 56 84  add 49 99  add 30 45  add 14 22  add 27 31  add 32 12  add 28 76  add 95 99  add 13 21  add 61 56  add 81 79  add 95 65  add 78 79  add 80 57  add 85 68  add 75 44  add 39 58  add 39 88  add 56 61  add 73 46  add 68 69  add 28 32  add 67 32  add 79 53  add 43 47  add 77 19  add 19 38  add 33 32  add 29 52  add 78 48  add 41 14  add 63 22  add 93 66  add 54 18  add 62 59  add 77 95  add 38 79  add 54 63  add 21 45  add 91 98  add 52 88  add 62 47  add 88 80  add 41 83  add 94 65  add 64 70  add 93 52  add 50 50  add 61 87  add 35 51  add 51 12  add 66 11  add 38 10  add 65 88  add 24 96  add 99 59  add 88 56  add 73 97  add 33 12  add 24 10  add 97 63  add 59 90  add 84 37  add 99 36  add 61 38  add 40 35  add 73 62  add 52 47  add 12 77  add 21 43  add 82 23  add 61 67  add 86 65  add 24 24  add 44 88  add 14 22  add 92 92  add 93 51  add 32 54  add 43 56  add 75 72  add 64 27  add 70 10  add 39 53  add 48 58  add 15 17  add 74 98  add 45 29  add 31 88  add 61 39  add 19 53  add 92 48  add 37 80  add 18 43  add 98 63  add 17 55  add 10 26  add 67 68  add 58 40  add 53 43  add 50 19  add 57 29  add 60 55  add 96 78  add 87 66  add 53 46  add 12 23  add 79 61  add 76 51  add 60 44  add 98 84  add 42 67  add 50 51  add 48 56  add 83 13  add 19 79  add 93 14  add 86 51  add 94 70  add 58 81  add 25 10  add 10 97  add 90 55  add 41 13  add 33 64  add 43 95  add 74 67  add 82 66  add 25 22  add 27 47  add 75 91  add 65 32  add 90 82  add 54 28  add 13 62  add 97 63  add 63 61  add 10 83  add 15 43  add 79 85  add 60 73  add 11 65  add 35 68  add 20 53  add 50 30  add 48 78  add 39 27  add 55 63  add 31 74  add 56 59  add 21 20  add 31 93  add 27 12  add 88 72  add 55 52  add 61 59  add 75 67  add 41 49  add 35 15  add 30 79  add 14 79  add 53 98  add 25 28  add 93 30  add 16 50  add 64 10  add 77 70  add 54 80  add 32 80  add 39 96  add 45 96  add 16 84  add 86 11  add 75 46  add 36 81  add 90 35  add 22 71  add 98 53  add 76 59  add 26 31  add 71 86  add 48 57  add 52 99  add 63 77  add 66 11  add 83 28  add 55 42  add 71 27  add 83 47  add 23 40  add 93 70  add 35 13  add 18 87  add 22 47  add 43 59  add 16 41  add 85 92  add 99 70  add 74 10  add 97 65  add 81 39  add 40 69  add 27 41  add 74 75  add 74 43  add 29 37  add 42 77  add 12 38  add 93 94  add 92 61  add 90 21  add 23 40  add 66 12  add 85 88  add 53 20  add 10 34  add 93 54  add 11 64  add 14 79  add 31 46  add 18 35  add 94 84  add 18 61  add 86 63  add 77 57  add 15 58  add 31 93  add 72 98  add 40 89  add 44 19  add 16 44  add 25 76  add 30 58  add 62 91  add 34 16  add 47 33  add 98 99  add 84 10  add 14 46  add 73 63  add 17 74  add 51 80  add 69 62  add 35 85  add 90 68  add 96 48  add 24 93  add 48 45  add 41 32  add 21 20  add 36 56  add 41 55  add 31 82  add 73 77  add 37 73  add 29 93  add 52 18  add 45 58  add 39 68  add 41 19  add 84 57  add 49 99  add 15 58  add 83 74  add 65 51  add 94 21  add 96 21  add 12 69  add 42 90  add 34 12  add 89 90  add 78 88  add 28 88  add 85 24  add 27 69  add 42 80  add 55 44  add 66 45  add 29 81  add 50 16  add 40 81  add 37 93  add 91 86  add 95 76  add 98 20  add 93 85  add 67 10  add 91 78  add 39 33  add 75 59  add 41 77  add 65 55  add 88 90  add 59 50  add 53 59  add 34 68  add 10 35  add 87 83  add 98 49  add 88 98  add 39 26  add 55 64  add 50 43  add 64 14  add 35 17  add 26 47  add 99 14  add 30 74  add 21 53  add 75 67  add 40 99  add 14 30  add 68 98  add 69 83  add 69 46  add 11 62  add 56 81  add 82 89  add 15 19  add 12 44  add 14 75  add 58 34  add 12 31  add 34 58  add 34 40  add 39 60  add 13 19  add 29 28  add 14 57  add 98 98  add 82 65  add 84 65  add 59 21  add 26 99  add 88 31  add 63 58  add 72 75  add 23 99  add 29 85  add 90 54  add 94 13  add 75 52  add 84 50  add 22 80  add 26 86  add 59 40  add 61 51  add 61 36  add 62 68  add 40 64  add 62 68  add 44 31  add 19 23  add 41 78  add 84 60  add 19 97  add 23 70  add 59 38  add 78 43  add 99 22  add 35 54  add 94 60  add 81 81  add 24 50  add 27 30  add 90 77  add 37 53  add 54 26  add 35 13  add 64 66  add 29 19  add 94 15  add 31 89  add 83 37  add 56 99  add 38 41  add 40 87  add 10 72  add 22 81  add 92 69  add 81 27  add 77 95  add 25 32  add 48 68  add 75 54  add 55 97  add 72 97  add 32 34  add 31 28  add 42 82  add 95 39  add 53 11  add 99 79  add 89 23  add 92 91  add 78 34  add 53 66  add 21 30  add 85 59  add 46 55  add 94 82  add 90 52  add 68 32  add 14 56  add 22 82  add 63 39  add 59 53  add 28 88  add 51 84  add 57 68  add 26 62  add 37 95  add 67 11  add 89 19  add 74 48  add 64 98  add 87 31  add 60 87  add 83 75  add 35 49  add 30 20  add 11 88  add 95 84  add 53 95  add 93 70  add 90 53  add 14 86  add 71 69  add 32 66  add 31 54  add 47 42  add 80 68  add 48 73  add 27 69  add 59 44  add 91 66  add 68 92  add 53 31  add 82 59  add 28 79  add 27 74  add 67 16  add 76 22  add 44 52  add 89 86  add 71 21  add 19 40  add 59 63  add 97 94  add 98 98  add 58 29  add 38 10  add 83 92  add 73 24  add 23 33  add 51 63  add 46 20  add 25 18  add 32 67  add 77 69  add 53 78  add 93 86  add 85 60  add 32 88  add 97 46  add 55 45  add 22 56  add 75 62  add 71 42  add 55 16  add 83 15  add 26 30  add 39 30  add 26 65  add 59 23  add 28 27  add 32 77  add 81 64  add 81 77  add 35 31  add 21 39  add 52 48  add 96 81  add 79 25  add 92 96  add 36 25  add 66 53  add 49 33  add 22 12  add 19 44  add 30 14  add 93 15  add 58 17  add 49 31  add 55 52  add 15 88  add 33 54  add 77 68  add 38 71  add 25 40  add 40 87  add 74 59  add 26 99  add 64 77  add 73 26  add 78 94  add 76 16  add 82 85  add 89 52  add 30 64  add 29 42  add 39 18  add 99 81  add 51 88  add 77 68  add 54 14  add 56 59  add 35 49  add 32 58  add 56 84  add 75 96  add 57 44  add 40 44  add 88 79  add 87 35  add 34 15  add 23 45  add 93 74  add 66 93  add 53 16  add 42 52  add 86 75  add 54 29  add 41 23  add 44 67  add 64 48  add 16 98  add 84 43  add 69 82  add 39 91  add 51 87  add 56 56  add 26 11  add 34 79  add 93 81  add 77 58  add 34 12  add 78 46  add 17 57  add 58 26  add 71 25  add 82 90  add 42 87  add 54 48  add 64 82  add 66 90  add 25 91  add 24 14  add 95 73  add 28 49  add 27 67  add 66 63  add 57 20  add 97 44  add 95 80  add 17 23  add 89 51  add 56 43  add 70 56  add 49 86  add 84 23  add 23 37  add 63 98  add 65 19  add 71 28  add 61 29  add 35 88  add 86 39  add 41 70  add 59 95  add 52 18  add 73 23  add 32 81  add 83 54  add 45 34  add 87 84  add 77 18  add 87 23  add 67 97  add 50 82  add 56 13  add 22 22  add 55 97  add 36 38  add 80 52  add 44 51  add 66 54  add 18 82  add 79 65  add 35 16  add 45 82  add 87 36  add 22 33  add 41 41  add 20 50  add 88 17  add 64 33  add 79 84  add 80 47  add 25 42  add 15 29  add 89 91  add 48 93  add 92 32  add 92 34  add 98 98  add 17 91  add 33 71  add 69 65  add 71 16  add 30 96  add 64 36  add 95 31  add 33 50  add 55 71  add 38 87  add 25 82  add 88 18  add 99 81  add 19 29  add 58 77  add 37 72  add 37 37  add 11 12  add 82 83  add 44 77  add 80 41  add 48 56  add 49 41  add 49 65  add 62 86  add 34 75  add 36 28  add 75 11  add 61 23  add 72 16  add 10 64  add 59 38  add 56 20  add 62 88  add 47 87  add 53 48  add 75 58  add 77 17  add 99 15  add 28 86  add 54 76  add 63 49  add 50 13  add 22 77  add 52 73  add 68 37  add 88 18  add 63 96  add 25 33  add 54 59  add 58 37  add 87 18  add 16 84  add 70 13  add 67 63  add 53 34  add 29 41  add 26 40  add 68 90  add 77 47  add 53 95  add 35 64  add 41 65  add 28 62  add 75 27  add 39 96  add 76 72  add 23 35  add 54 42  add 55 29  add 40 38  add 32 26  add 90 41  add 41 22  add 77 10  add 34 51  add 73 38  add 48 10  add 27 39  add 35 81  add 52 85  add 47 88  add 16 53  add 96 48  add 43 45  add 39 45  add 49 30  add 84 82  add 34 92  add 71 14  add 47 65  add 77 88  add 33 40  add 55 27  add 22 77  add 38 14  add 24 88  add 46 86  add 41 68  add 54 23  add 95 45  add 23 58  add 15 66  add 33 15  add 21 93  add 93 71  add 12 95  add 73 56  add 93 11  add 99 46  add 33 79  add 26 60  add 59 98  add 15 33  add 17 90  add 88 34  add 58 48  add 97 51  add 17 32  add 32 30  add 15 16  add 37 10  add 87 95  add 30 43  add 86 96  add 50 65  add 42 14  add 84 50  add 32 35  add 10 18  add 93 36  add 70 99  add 27 79  add 58 10  add 59 38  add 33 21  add 54 67  add 33 90  add 80 30  add 32 15  add 96 87  add 15 36  add 95 26  add 55 32  add 74 84  add 48 34  add 93 99  add 83 55  add 70 69  add 61 90  add 61 95  add 26 61  add 52 54  add 96 37  add 57 99  add 81 58  add 22 42  add 54 38  add 59 23  add 46 44  add 71 44  add 28 94  add 21 58  add 89 96  add 19 97  add 29 35  add 15 89  add 40 48  add 82 16  add 67 66  add 82 15  add 44 35  add 68 38  add 17 69  add 82 32  add 25 44  add 44 40  add 84 40  add 55 40  add 78 45  add 71 53  add 85 17  add 71 74  add 78 60  add 51 97  add 21 58  add 21 67  add 35 32  add 59 97  add 64 89  add 96 90  add 28 46  add 17 96  add 55 53  add 69 66  add 90 43  add 34 43  add 80 66  add 24 45  add 65 35  add 25 16  add 77 81  add 14 33  add 14 14  add 10 65  add 12 66  add 57 69  add 41 39  add 23 26  add 24 13  add 95 51  add 14 40  add 83 92  add 18 86  add 82 29  add 29 79  add 64 22  add 64 18  add 57 83  add 40 63  add 47 89  add 59 19  add 91 96  add 77 28  add 82 48  add 53 58  add 25 93  add 32 60  add 31 41  add 14 57  add 69 53  add 28 71  add 90 33  add 77 38  add 76 86  add 15 81  add 82 13  add 66 25  add 29 24  add 38 38  add 28 86  add 77 17  add 46 63  add 86 62  add 99 47  add 63 55  add 97 26  add 74 31  add 32 13  count | False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  90 |
| **Вход** | **Изход** |
| 199  add 241 963  contains 506  contains 280  values 779  count  values 880  count  add 452 330  count  values 432  count  values 703  count  values 309  values 202  contains 573  count  contains 54  count  count  count  contains 683  contains 189  count  count  add 377 651  contains 157  values 353  add 314 671  contains 450  add 11 428  values 98  count  contains 323  contains 410  count  contains 924  count  add 594 783  contains 638  contains 169  values 932  count  values 123  add 922 848  count  count  values 144  contains 361  count  values 875  contains 316  contains 939  values 637  add 924 815  contains 825  values 398  contains 32  values 281  count  add 102 997  values 212  values 474  add 151 492  contains 321  add 682 600  values 62  count  add 229 53  count  add 872 307  count  add 89 38  contains 774  count  count  add 324 891  values 608  add 766 464  contains 486  contains 341  count  contains 143  add 489 604  contains 752  add 199 783  values 125  contains 797  contains 385  add 559 717  count  values 950  count  contains 30  count  add 356 764  count  values 664  contains 812  contains 953  values 548  values 63  contains 269  values 541  add 752 941  count  add 79 377  values 866  add 495 727  values 450  count  add 493 396  count  contains 974  add 594 855  add 700 454  contains 572  contains 798  contains 40  values 669  count  contains 911  add 685 110  values 798  contains 317  add 167 479  add 835 569  add 982 199  contains 849  add 85 246  count  contains 738  count  add 228 766  contains 968  values 180  contains 582  add 602 599  add 390 90  contains 49  contains 975  contains 736  add 678 747  values 250  values 120  count  contains 832  add 371 526  contains 275  contains 323  add 698 909  add 987 967  count  contains 473  count  add 547 197  values 649  add 618 127  contains 19  values 717  values 59  add 918 319  contains 228  contains 804  values 987  contains 333  count  contains 539  add 711 367  add 777 361  add 878 466  values 411  add 907 458  contains 531  count  count  contains 849  values 69  contains 838  count  values 653  count  contains 471  contains 372  contains 79  add 837 652  contains 940  contains 5  count  count  count  add 45 659  count  add 455 248  values 539  values 554  add 64 528  values 871  contains 800 | False  False  1  1  2  2  2  False  2  False  2  2  2  False  False  2  2  False  False  5  False  False  5  False  5  False  False  6  7  7  False  7  False  False  False  False  8  False  11  12  13  False  14  14  False  False  16  False  False  False  False  19  19  False  19  20  False  False  False  21  23  24  False  False  False  False  25  False  False  False  30  False  30  False  False  False  False  False  34  False  False  False  37  False  37  False  True  False  967  False  40  False  False  44  44  False  False  44  44  False  False  True  False  False  45  45  45  46  False |
| **Вход** | **Изход** |
| 135  count  add 182 236  count  count  count  values 22  add 688 831  contains 729  contains 366  add 836 908  contains 795  add 290 144  count  values 703  add 636 710  add 274 383  count  contains 476  count  values 288  contains 636  contains 177  add 131 84  count  values 3  count  contains 136  contains 251  contains 157  values 37  values 484  values 101  add 312 34  count  count  count  values 177  add 282 547  add 910 95  add 253 13  count  count  values 175  count  add 994 613  add 725 584  contains 217  add 804 960  contains 523  values 2  contains 637  add 768 826  count  count  contains 500  count  count  add 607 24  count  add 837 925  values 245  add 800 314  contains 401  contains 894  add 743 201  count  contains 153  count  count  contains 325  add 349 995  contains 405  add 792 265  count  add 192 656  contains 122  contains 608  contains 961  values 323  count  count  count  count  add 845 298  values 888  values 356  contains 705  values 657  contains 919  contains 634  contains 521  count  values 552  contains 540  add 78 766  values 534  count  count  count  add 813 83  contains 543  contains 814  values 376  count  contains 462  values 847  count  add 688 81  count  add 801 867  count  contains 669  contains 765  add 198 924  count  add 353 304  values 843  count  count  values 75  values 693  add 494 900  add 589 232  contains 732  count  count  values 144  contains 148  count  count  values 921  values 593  contains 451  add 585 108  contains 48 | 0  1  1  1  False  False  False  4  6  False  6  True  False  7  7  False  False  False  8  8  8  11  11  11  False  False  False  15  15  False  15  15  16  False  False  19  False  19  19  False  False  21  False  False  False  22  22  22  22  False  False  False  False  23  False  24  24  24  False  False  25  False  25  25  26  False  False  27  28  28  False  30  30  False  30  30  False  False |
| **Вход** | **Изход** |
| 159  count  contains 495  contains 770  add 352 232  add 543 402  contains 319  count  values 795  count  add 644 688  contains 517  add 19 248  contains 998  values 539  count  add 799 49  count  values 207  contains 705  count  contains 207  add 98 486  count  contains 243  values 623  count  add 265 340  values 7  values 392  count  count  count  add 559 692  contains 306  contains 608  values 505  values 53  contains 880  values 480  count  count  contains 760  contains 268  add 169 76  count  values 458  add 428 4  values 265  count  add 639 648  contains 352  add 655 911  count  count  values 409  count  count  count  contains 645  count  contains 715  contains 989  values 389  contains 389  count  add 540 456  contains 935  values 262  values 259  values 824  add 544 104  values 909  values 296  contains 919  contains 16  contains 782  contains 146  contains 742  add 717 258  values 963  values 511  count  values 807  values 621  add 511 183  contains 821  count  add 611 798  add 44 93  values 469  contains 127  values 674  values 789  add 520 855  contains 573  values 103  contains 593  count  add 69 359  add 744 75  values 898  values 362  add 938 943  values 672  add 970 493  add 383 398  add 956 147  count  contains 656  contains 95  values 183  count  add 352 72  values 733  values 725  contains 294  add 712 488  values 299  contains 916  values 407  values 610  contains 209  add 778 113  add 660 89  count  add 802 43  add 597 920  contains 866  contains 432  add 768 423  add 324 515  count  count  add 77 739  values 688  values 573  values 808  count  count  values 522  add 635 254  add 271 669  count  add 378 985  add 171 975  values 842  add 121 723  count  contains 830  contains 11  contains 420  add 60 605  values 112  count  contains 835  values 819  add 168 986  add 846 158  add 706 92 | 0  False  False  False  2  2  False  False  4  5  False  5  False  6  False  6  7  7  7  False  False  False  8  8  False  False  9  340  10  True  12  12  12  12  12  False  12  False  False  False  12  False  False  False  False  False  False  15  False  16  False  False  False  19  25  False  False  25  False  False  False  28  False  False  32  32  33  33  35  38  False  False  False  39  False |
| **Вход** | **Изход** |
| 148  values 751  contains 31  add 473 371  count  values 633  count  count  add 285 45  contains 693  add 202 376  values 558  add 893 224  count  values 981  contains 447  contains 148  contains 628  contains 682  add 69 996  count  contains 283  values 821  count  add 150 877  count  values 726  count  count  values 498  count  contains 698  values 691  contains 390  values 458  add 293 566  contains 639  count  count  contains 184  values 685  contains 740  count  contains 175  add 887 724  contains 720  count  values 720  add 244 158  count  count  count  contains 300  contains 359  values 98  count  contains 237  values 504  add 80 542  count  values 661  add 196 630  count  values 665  add 738 726  count  values 373  count  add 41 359  values 82  count  add 381 633  count  contains 562  contains 832  add 616 240  count  count  count  contains 41  add 632 822  values 634  count  contains 46  contains 637  count  values 688  count  contains 200  count  values 599  count  count  values 937  values 172  values 852  add 486 200  count  add 812 163  values 727  add 198 751  contains 759  contains 780  add 288 807  add 746 873  add 814 535  contains 303  contains 399  contains 901  contains 800  contains 500  contains 422  add 235 29  contains 613  add 143 261  add 852 520  values 13  values 631  count  contains 106  add 446 386  values 304  contains 606  count  add 155 487  values 152  count  add 357 828  add 778 618  add 856 896  contains 386  values 782  contains 386  values 269  count  add 488 252  add 35 352  values 519  values 164  values 987  values 198  contains 260  values 655  add 578 586  add 973 391  contains 834  count  count  contains 946 | False  1  1  1  False  4  False  False  False  False  5  False  5  6  6  6  6  False  False  False  7  7  False  False  7  False  False  8  9  9  9  False  False  9  False  10  11  12  12  13  14  False  False  15  15  15  True  16  False  False  16  16  False  16  16  16  17  False  False  False  False  False  False  False  False  False  25  False  False  26  27  False  False  30  751  False  False  34  34  False |
| **Вход** | **Изход** |
| 172  contains 129  count  contains 958  add 244 334  count  count  contains 746  contains 266  contains 487  values 751  add 166 348  count  count  values 37  add 831 25  count  contains 659  contains 759  contains 581  add 443 106  contains 275  count  contains 466  count  add 332 334  count  contains 967  values 384  values 451  count  count  values 473  contains 864  add 218 80  values 757  values 986  values 684  contains 43  contains 206  contains 836  values 891  add 670 705  values 453  count  count  contains 274  values 307  count  count  add 970 496  contains 85  add 449 623  contains 167  count  count  contains 93  values 253  add 24 614  contains 430  values 803  values 106  contains 923  values 191  count  add 678 654  count  count  add 241 525  contains 726  count  count  count  contains 359  count  values 201  count  count  add 765 693  contains 829  count  add 591 574  count  add 655 431  add 12 667  contains 268  contains 850  add 653 360  values 191  add 333 300  contains 719  values 721  count  values 386  count  values 905  contains 91  values 649  values 315  contains 713  values 459  count  contains 669  count  contains 511  count  count  count  values 557  contains 24  values 46  values 372  count  add 637 648  contains 682  values 672  contains 944  count  contains 45  count  count  count  values 810  values 49  count  add 921 409  values 985  add 348 930  add 40 602  add 943 73  count  add 811 868  add 858 820  add 566 22  contains 359  count  add 337 150  add 193 805  values 301  count  add 703 636  contains 462  contains 486  values 759  contains 102  count  values 130  add 942 843  add 663 159  count  count  add 626 724  count  contains 915  values 409  count  add 771 189  values 107  add 507 395  add 518 661  count  add 257 179  add 207 88  add 350 614  add 142 945  values 500  add 777 193  add 570 920  count  count  add 504 796  add 954 709  count | False  0  False  1  1  False  False  False  2  2  3  False  False  False  False  4  False  4  5  False  5  5  False  False  False  False  7  7  False  7  7  False  False  9  9  False  False  False  10  11  11  False  12  12  12  False  12  12  12  False  13  14  False  False  False  18  18  False  False  18  False  18  False  18  18  18  True  18  False  False  19  False  19  19  19  19  23  False  26  28  False  False  False  29  31  31  32  False  32  35  41  41  43 |
| **Вход** | **Изход** |
| 495  contains 871  contains 578  add 851 501  contains 668  add 230 19  values 924  add 308 73  values 353  count  count  add 880 330  contains 36  count  values 554  count  contains 891  contains 543  contains 857  count  values 343  contains 947  add 226 131  contains 145  add 167 634  count  add 610 355  contains 13  contains 990  count  add 995 591  contains 64  count  contains 339  count  count  count  count  values 161  contains 637  contains 197  values 749  values 419  values 92  count  add 185 898  contains 998  contains 840  values 164  values 347  add 434 4  values 613  add 863 775  values 308  contains 965  values 718  add 816 822  add 555 593  add 498 160  values 171  contains 803  count  values 572  count  contains 262  count  contains 78  add 979 135  contains 556  add 337 44  contains 219  values 817  values 713  add 626 609  count  add 625 273  add 698 994  count  contains 882  add 850 857  contains 644  add 147 622  values 105  add 37 95  add 115 124  values 674  values 512  add 555 832  add 957 119  values 805  add 280 140  add 976 180  add 194 857  contains 299  contains 624  add 173 520  contains 267  add 464 157  add 747 319  count  add 702 627  add 813 745  contains 317  count  contains 563  values 876  add 915 6  values 267  count  count  count  values 88  count  count  count  contains 25  count  contains 988  contains 820  contains 909  count  contains 176  add 771 773  count  count  count  contains 555  contains 206  add 457 236  values 313  values 56  add 614 246  contains 372  add 499 895  contains 605  add 144 177  add 437 479  contains 223  contains 601  add 605 591  values 756  contains 483  values 964  count  add 218 876  contains 730  values 281  count  contains 716  count  count  contains 891  contains 410  contains 55  contains 978  count  contains 650  count  values 573  add 475 950  contains 571  contains 930  count  count  values 267  contains 420  contains 198  count  contains 946  count  contains 18  contains 191  count  add 428 105  values 919  contains 568  contains 665  add 840 805  contains 13  add 621 468  count  contains 767  add 13 634  add 780 215  values 703  add 295 554  count  count  contains 492  add 547 943  count  contains 243  contains 869  count  contains 392  values 538  values 706  add 715 197  count  add 151 793  values 206  contains 672  values 520  count  contains 517  contains 915  contains 2  add 525 938  values 523  count  add 371 431  count  count  count  values 307  add 838 125  values 401  count  count  contains 737  contains 47  count  add 498 660  add 870 840  add 798 632  contains 777  count  values 792  add 422 506  values 245  add 961 212  count  values 392  contains 513  add 653 464  values 278  contains 143  add 645 710  add 517 618  count  add 674 395  add 711 958  contains 334  values 102  values 414  values 417  values 211  values 824  add 327 839  add 168 899  count  contains 757  contains 360  contains 291  count  contains 775  values 537  values 702  contains 703  values 843  contains 362  values 863  values 726  add 434 813  count  count  count  contains 958  contains 495  contains 33  add 14 974  add 810 618  values 57  contains 461  count  add 144 504  count  values 416  values 30  contains 775  add 396 926  values 901  values 335  add 899 31  count  add 646 502  values 869  contains 551  count  add 844 167  contains 115  contains 245  values 868  contains 541  contains 464  values 258  add 618 47  count  values 626  count  values 659  count  values 52  count  add 532 125  values 254  values 560  values 864  contains 810  count  contains 186  count  contains 358  count  values 216  count  count  count  values 199  contains 623  contains 961  contains 305  add 566 747  values 335  count  contains 446  contains 364  count  count  values 237  add 252 440  values 313  count  add 991 836  add 670 261  count  contains 610  add 937 969  count  count  contains 712  values 384  add 90 719  values 247  values 61  add 312 584  add 391 183  contains 648  add 205 202  contains 638  add 73 176  values 836  contains 426  count  values 605  contains 323  count  add 852 223  contains 216  contains 984  add 644 949  contains 538  add 973 298  count  add 147 415  values 270  count  add 913 782  add 719 425  contains 76  contains 964  values 48  add 786 425  contains 988  count  contains 590  count  add 457 398  contains 553  add 36 800  count  add 341 72  values 794  count  values 169  add 558 343  contains 242  values 697  add 845 512  values 523  add 957 234  contains 765  values 456  count  count  add 297 667  count  add 760 499  values 326  values 115  values 819  count  add 247 919  values 703  contains 445  contains 615  add 276 298  add 106 392  add 860 853  count  contains 857  count  contains 291  values 993  add 195 519  contains 780  contains 339  contains 46  count  values 52  values 683  values 458  contains 528  values 950  contains 393  contains 290  add 262 411  add 576 926  contains 628  values 710  contains 250  add 95 359  contains 959  contains 59  values 189  values 101  contains 753  count  contains 147  count  add 481 804  contains 228  count  contains 285  count  values 120  values 217  add 42 179  contains 269  contains 168  count  values 787  count  contains 100  count  add 680 327  add 347 424  count  values 228  contains 638  values 706  values 294  contains 778  values 99  values 642  add 552 17  add 993 978  values 50  contains 471  values 128  add 356 605  values 769  values 435  values 318  values 480  add 309 880  count  add 291 8  count  contains 128  contains 102  add 310 46  count  count  count  values 534  add 651 831  contains 484  contains 769  add 166 663  add 324 245  add 921 821  add 650 747  values 685  add 462 0  count | False  False  False  3  3  False  4  4  False  False  False  4  False  False  6  False  False  7  False  8  False  8  8  8  8  False  False  8  False  False  73  False  False  14  14  False  14  False  False  False  17  19  False  False  False  False  False  30  False  32  False  33  33  33  33  33  33  False  33  False  False  False  33  False  34  34  34  True  False  False  False  False  False  False  40  False  41  False  41  41  False  False  False  False  41  False  41  False  False  42  42  False  False  42  False  42  False  False  42  False  False  False  45  False  48  48  False  49  False  False  49  False  50  False  51  False  True  False  52  53  53  53  54  54  False  False  54  False  56  58  False  False  61  False  65  False  False  False  65  False  627  False  False  775  65  65  65  False  False  False  False  67  67  False  69  False  70  True  False  False  True  72  609  72  72  72  True  73  False  73  False  73  73  73  73  False  True  False  74  False  False  74  74  75  77  True  78  78  False  False  False  False  83  591  False  83  False  False  False  86  86  False  False  False  89  False  89  False  90  91  False  False  93  93  94  124  95  False  False  99  False  99  False  True  False  False  100  False  False  False  False  False  False  False  False  103  True  103  False  104  False  104  False  True  105  105  False  105  107  False  False  False  111  112  False  False  113  113  113  False  False  119 |
| **Вход** | **Изход** |
| 753  count  contains 540  values 917  count  add 334 482  add 178 577  count  count  count  values 277  add 180 227  contains 227  contains 418  contains 299  count  add 592 184  values 862  contains 242  values 68  add 629 480  contains 706  values 692  contains 345  values 223  contains 54  count  add 513 732  contains 550  add 21 122  count  contains 32  values 742  count  add 315 858  add 566 423  values 648  contains 659  contains 784  contains 7  add 779 76  values 156  count  add 461 129  add 691 706  add 70 370  values 488  values 101  count  count  add 63 165  add 631 535  count  values 73  add 766 589  add 49 478  contains 181  contains 489  add 777 185  contains 365  values 375  contains 277  values 170  contains 683  add 739 43  contains 910  values 525  contains 588  contains 56  add 924 117  add 21 891  count  count  add 611 160  count  values 317  values 177  count  values 196  values 903  count  add 449 274  add 762 630  count  add 772 646  add 129 719  count  contains 341  contains 385  contains 863  contains 71  values 248  add 398 110  contains 269  values 391  contains 152  contains 840  contains 760  add 129 690  values 983  values 513  count  contains 597  count  count  values 92  values 470  add 902 12  count  add 806 364  contains 733  values 858  count  count  values 110  contains 74  contains 695  count  values 925  contains 231  count  values 484  values 752  add 354 821  contains 191  add 707 828  add 734 209  values 170  add 80 981  count  values 737  count  values 360  count  count  contains 648  add 370 780  add 136 321  contains 768  contains 547  add 675 279  values 403  values 877  values 485  count  contains 720  count  count  add 2 747  count  values 838  add 424 24  contains 998  count  add 193 598  values 202  count  contains 533  values 582  contains 874  add 984 483  count  values 64  values 394  values 529  values 133  contains 250  values 695  contains 612  contains 736  values 66  contains 684  add 598 288  add 48 916  count  contains 395  values 228  add 355 533  contains 959  contains 604  count  contains 398  count  count  values 628  values 7  count  values 870  add 18 259  values 238  count  values 746  count  add 223 168  contains 702  add 763 339  values 99  contains 191  count  contains 208  count  values 285  count  contains 72  values 974  contains 524  values 210  values 557  count  add 183 798  count  count  count  add 726 610  values 864  contains 14  add 239 679  contains 367  add 511 454  add 439 125  count  add 249 473  add 839 811  add 782 698  values 508  count  add 237 914  add 57 675  count  values 435  values 740  count  values 113  values 700  add 839 173  contains 673  values 318  add 755 512  values 118  values 854  count  count  contains 287  contains 130  add 454 396  count  add 368 838  add 508 17  count  contains 968  count  contains 858  contains 764  contains 16  values 870  count  contains 903  count  values 580  contains 406  contains 558  count  contains 563  contains 443  values 711  count  add 119 535  contains 143  add 149 540  add 458 608  values 568  contains 211  count  add 850 447  contains 464  count  contains 102  count  values 360  count  contains 146  count  values 52  count  values 799  count  contains 402  values 138  count  count  add 798 758  values 632  contains 297  count  contains 373  values 840  values 498  count  count  count  contains 892  values 970  add 704 914  add 863 411  values 589  count  contains 605  add 794 500  count  contains 821  contains 756  count  contains 822  contains 84  contains 979  count  values 117  add 172 245  contains 493  add 93 843  values 769  add 366 847  add 783 361  contains 95  values 128  values 511  values 136  count  count  add 173 829  contains 883  add 28 472  count  count  count  contains 300  count  add 690 986  values 667  add 861 678  contains 722  values 884  count  values 205  contains 214  add 232 232  values 920  add 254 886  values 337  count  values 365  add 210 794  contains 918  add 525 0  count  count  count  contains 425  add 747 998  values 255  count  values 203  count  count  add 566 289  contains 731  add 690 747  count  values 381  contains 623  add 728 855  values 33  add 640 977  values 315  count  values 506  values 170  add 109 945  add 751 914  contains 8  contains 545  values 930  values 506  values 627  add 385 124  values 79  count  count  values 989  contains 319  add 251 794  values 225  add 519 665  count  values 219  values 709  count  contains 226  count  add 283 862  count  values 687  count  contains 382  values 91  contains 826  add 172 141  contains 491  values 834  values 568  contains 258  values 537  contains 824  count  count  contains 359  add 844 545  contains 747  values 314  contains 343  add 842 201  count  values 549  values 47  values 114  values 962  count  contains 671  contains 603  contains 382  add 626 105  values 435  contains 508  values 613  count  count  contains 176  add 490 529  contains 546  values 857  values 851  values 587  count  contains 396  values 182  values 170  add 219 932  contains 716  add 874 765  contains 474  contains 194  contains 435  count  contains 769  values 132  values 989  values 772  count  add 849 518  contains 763  count  contains 800  contains 295  add 526 244  contains 774  count  values 780  add 382 420  contains 196  add 931 977  contains 879  add 928 181  count  count  contains 359  values 622  add 2 360  contains 767  count  count  add 842 450  add 127 744  add 209 641  count  values 519  contains 366  contains 785  contains 848  values 811  add 879 79  contains 298  values 765  contains 777  values 636  contains 201  values 966  add 526 515  values 305  values 971  contains 57  contains 839  add 256 470  add 652 898  add 642 171  count  values 744  values 220  values 448  count  values 752  count  count  contains 400  contains 259  add 95 445  values 142  add 21 143  count  contains 509  add 560 120  contains 636  contains 739  contains 325  values 702  contains 327  count  contains 859  count  add 521 472  values 823  values 459  values 571  contains 29  add 741 601  count  contains 468  count  values 748  add 685 758  add 740 321  count  count  contains 118  contains 602  count  contains 901  values 219  contains 350  contains 661  values 65  values 709  contains 584  add 347 4  values 110  contains 111  count  contains 763  count  add 502 480  values 239  count  add 426 864  add 699 417  count  values 923  count  add 79 620  values 293  add 737 295  add 559 259  count  values 179  count  count  add 750 537  values 122  contains 695  contains 822  count  contains 558  count  values 695  add 186 399  add 210 935  values 175  values 765  add 825 680  add 589 492  contains 599  count  add 557 277  add 146 395  count  add 42 10  contains 178  values 212  values 216  count  contains 156  add 410 274  contains 658  add 936 866  add 418 232  values 955  values 128  contains 138  values 110  count  contains 825  values 856  add 283 586  count  contains 816  values 293  values 527  count  values 970  values 619  values 209  contains 368  contains 809  add 640 219  contains 527  contains 450  add 281 528  count  count  count  count  count  count  contains 253  add 441 939  values 427  contains 184  contains 154  add 118 43  add 457 336  add 946 642  count  contains 85  add 526 108  contains 999  values 460  contains 574  add 495 645  count  add 149 870  count  add 642 499  values 570  count  add 238 428  values 146  count  count  contains 129  values 168  add 914 830  add 427 584  contains 162  contains 902  contains 397  values 288  add 176 561  count  contains 187  count  contains 222  add 437 571  add 313 181  add 510 365  values 106  add 234 40  add 785 57  values 650  values 401  count  values 603  contains 959  add 901 303  count  contains 896  contains 692  values 721  values 525  count  values 467  count  count  contains 718  add 952 136  count  contains 667  count  contains 531  values 599  contains 968  count  count  values 211  add 960 80  add 475 542  count  contains 928  contains 364  contains 522  add 183 213  values 417  add 58 567  contains 737  count  count  add 871 188  add 888 109  add 995 256  add 298 547  contains 751  count  values 828  contains 134  add 953 8  values 415  count  add 997 346  values 643  contains 222  values 935  count  contains 63  count  add 422 308  contains 265  values 885  contains 375  contains 597  add 739 943  contains 229  count  add 59 772  contains 804  add 710 68  contains 637  add 743 573  count  contains 821  count  contains 712  contains 281  contains 987  contains 717  contains 331  contains 752  values 604 | 0  False  0  2  2  2  False  False  False  3  False  False  False  False  5  False  7  False  7  False  False  False  10  13  13  15  False  False  False  False  False  False  False  False  20  20  21  21  21  23  25  False  False  False  False  False  False  False  False  732  26  False  26  26  27  False  28  28  False  False  28  False  28  False  32  32  32  32  False  False  False  35  False  35  35  36  False  37  38  False  False  39  False  False  False  False  41  False  False  False  42  True  42  42  42  43  43  False  False  45  False  45  45  False  False  45  46  46  46  False  False  50  53  55  55  False  56  56  False  False  57  59  False  59  False  False  False  59  False  59  False  False  59  False  False  59  False  False  62  False  63  False  63  63  False  63  63  63  False  63  63  False  64  False  64  64  64  False  66  False  67  False  False  67  False  False  False  67  False  False  454  321  71  71  False  73  73  73  False  73  False  75  False  77  False  79  79  79  False  80  80  80  False  80  False  858  82  False  False  85  85  False  87  87  False  87  88  88  False  False  False  False  False  88  88  False  True  False  90  90  False  False  False  True  91  91  False  False  92  False  False  False  False  False  94  False  646  94  True  95  False  False  False  96  False  False  99  99  False  False  99  99  101  665  True  False  False  False  True  False  True  True  105  105  105  105  False  False  106  False  False  True  False  False  107  False  107  False  109  False  109  111  111  False  False  111  False  932  False  False  False  False  112  True  112  679  113  115  115  118  118  118  False  False  119  False  119  False  122  124  True  125  False  False  False  128  True  128  False  128  641  True  False  False  False  129  129  129  129  129  129  False  False  False  133  False  False  False  134  134  134  395  135  135  True  False  True  False  138  False  138  False  143  False  144  False  False  0  144  144  144  False  145  False  145  False  False  145  145  147  True  False  False  True  148  148  True  152  False  153  False  154  True  154  False  False  False  False  155  False  False  158  False  158  False  True  False  False  False  False |
| **Вход** | **Изход** |
| 1000  count  count  count  values 772  count  count  values 795  add 27 561  count  values 59  count  add 597 620  values 974  contains 52  count  values 229  contains 329  count  contains 507  count  values 850  count  values 281  contains 93  contains 998  add 492 864  contains 886  values 294  values 593  count  contains 829  add 861 657  count  add 56 543  values 43  contains 180  contains 563  contains 544  contains 304  add 349 504  values 784  values 241  add 789 869  add 312 414  values 270  values 633  values 988  contains 466  add 601 549  values 954  contains 311  add 38 238  count  contains 610  count  values 241  values 220  values 415  add 260 186  count  count  contains 732  values 905  values 739  contains 110  values 875  contains 954  add 829 398  values 990  values 630  values 740  values 325  count  contains 751  contains 40  add 366 969  count  add 460 325  values 401  count  add 499 887  count  values 612  add 286 842  count  contains 486  add 508 555  contains 708  values 406  contains 384  add 51 514  values 471  values 334  contains 578  contains 615  contains 699  contains 131  values 279  add 713 28  add 909 296  count  contains 257  count  values 745  values 499  count  values 907  values 447  count  contains 300  contains 912  contains 264  values 934  values 410  values 424  contains 429  values 693  contains 149  count  values 23  add 214 444  count  values 826  add 238 762  values 714  contains 538  contains 730  add 116 653  contains 410  contains 752  values 596  count  add 322 705  contains 158  values 660  contains 349  count  add 263 435  contains 438  values 695  add 618 150  contains 53  contains 63  contains 490  count  contains 345  count  count  count  values 42  values 503  count  contains 603  add 53 991  add 386 644  contains 680  add 205 528  values 557  add 446 692  add 623 642  values 668  count  add 346 882  values 718  count  count  values 934  contains 140  contains 583  add 748 864  count  count  values 809  count  count  values 606  values 137  count  count  contains 880  contains 559  values 773  add 644 306  count  values 326  count  add 270 945  contains 966  contains 350  values 235  count  add 50 858  values 616  contains 276  add 580 14  add 107 54  values 580  contains 809  add 104 558  values 492  contains 522  add 148 871  values 926  count  add 405 470  contains 433  contains 77  values 402  add 30 491  count  count  add 111 216  add 140 310  values 272  values 677  count  contains 430  count  contains 467  contains 390  add 88 964  contains 637  count  count  add 578 833  contains 988  contains 327  add 308 277  add 932 851  contains 615  contains 778  contains 792  add 701 78  contains 420  values 456  contains 417  count  count  contains 474  contains 527  add 732 2  contains 850  add 165 584  add 58 423  contains 807  contains 458  count  add 71 844  count  values 991  values 412  contains 531  values 910  values 960  contains 657  add 323 674  values 652  add 715 643  values 117  values 682  values 399  contains 993  values 822  add 535 629  count  contains 78  values 589  values 319  count  count  contains 161  count  values 331  count  values 575  values 3  count  add 503 673  add 154 415  count  values 894  values 68  values 134  add 886 586  contains 988  add 325 396  count  contains 423  values 295  add 68 166  add 382 41  add 179 428  values 62  add 739 174  contains 436  count  count  contains 362  count  contains 445  values 375  contains 718  contains 960  values 850  add 241 859  add 272 715  values 569  add 641 955  contains 73  contains 553  add 888 809  values 14  count  values 431  add 492 622  count  contains 796  count  count  add 608 962  values 800  values 990  add 721 494  contains 597  contains 297  add 372 372  values 337  values 868  add 804 501  count  values 817  contains 649  count  add 773 704  add 735 990  add 711 753  count  values 566  add 520 615  add 710 744  count  count  values 825  count  count  contains 218  values 460  count  values 62  count  contains 275  count  values 893  contains 562  add 261 661  add 968 932  count  values 283  values 248  add 72 339  count  contains 401  count  add 551 516  add 650 348  values 305  contains 972  values 253  contains 308  add 182 204  values 236  values 490  contains 308  count  contains 575  add 891 989  values 194  contains 866  contains 682  add 45 961  contains 312  count  contains 331  count  values 30  add 939 947  values 135  count  count  contains 824  contains 242  add 667 74  add 870 315  contains 778  add 386 9  contains 143  add 242 377  values 451  values 228  values 655  count  count  add 943 98  values 783  count  add 821 31  values 984  count  contains 77  count  count  contains 552  contains 644  add 313 804  values 892  add 387 193  values 421  count  count  add 730 60  values 217  values 994  values 164  add 594 378  add 949 840  values 15  count  contains 425  add 844 123  values 139  count  values 749  add 29 824  contains 500  contains 115  values 17  contains 129  values 557  contains 480  add 718 426  contains 943  add 541 177  contains 881  values 314  count  contains 198  values 872  values 244  values 134  count  values 877  contains 833  add 828 507  count  contains 868  count  count  add 142 713  contains 985  contains 485  values 307  contains 661  count  values 199  values 721  count  values 312  values 345  contains 733  contains 29  add 157 712  contains 166  add 970 966  values 517  add 73 130  values 687  count  count  add 256 216  count  add 834 10  values 93  contains 556  count  add 418 409  add 712 875  count  values 182  add 517 691  count  values 682  values 647  add 72 624  contains 62  contains 477  count  contains 58  count  contains 883  add 517 413  contains 950  add 646 908  count  add 287 534  add 914 738  contains 12  add 152 246  add 966 620  values 756  values 802  values 832  values 817  add 71 298  add 0 277  contains 862  contains 116  contains 708  add 336 107  values 701  contains 807  contains 819  add 455 744  add 896 481  values 994  count  contains 76  count  add 211 462  values 846  contains 247  count  count  contains 130  count  count  contains 594  contains 994  add 194 25  count  values 906  contains 553  values 104  values 916  values 286  count  contains 283  values 125  contains 159  values 999  contains 424  count  contains 325  count  values 318  values 162  values 195  contains 51  add 214 304  values 249  values 634  count  count  contains 282  contains 737  values 747  count  add 834 245  add 464 860  contains 305  count  add 112 785  values 753  values 91  values 611  add 615 821  values 910  values 365  add 57 935  count  contains 607  values 571  count  add 165 949  count  contains 279  contains 999  contains 40  values 849  contains 613  contains 190  values 126  values 131  contains 206  values 275  values 355  values 618  values 693  contains 238  add 490 596  contains 142  contains 24  values 954  values 242  values 197  contains 567  count  count  add 753 480  add 439 770  values 240  contains 495  add 475 42  add 862 439  contains 634  add 17 936  add 286 102  values 176  values 964  add 77 313  values 359  count  values 940  add 194 774  contains 645  count  count  add 792 388  values 809  count  count  contains 881  contains 426  count  add 466 378  add 263 944  values 185  contains 181  count  add 718 153  values 319  count  values 330  count  count  contains 222  count  contains 263  add 584 625  count  count  count  values 964  values 473  contains 117  contains 775  contains 277  values 882  count  count  add 655 458  add 324 20  add 54 884  count  add 68 499  values 928  count  contains 182  contains 171  add 754 374  count  contains 222  count  contains 712  add 708 340  values 305  add 360 126  contains 88  count  add 878 79  count  add 673 617  contains 846  count  contains 690  add 176 90  count  count  add 533 102  contains 629  count  contains 790  values 107  add 930 568  count  add 93 335  add 303 674  add 218 903  contains 839  contains 454  count  add 206 784  add 629 79  add 981 986  contains 457  contains 391  count  count  contains 422  contains 278  values 671  contains 798  add 786 765  add 792 629  count  values 920  values 208  values 696  count  values 301  count  add 63 107  contains 627  values 282  contains 892  count  add 259 430  count  values 421  count  contains 428  values 890  count  count  count  values 536  contains 183  contains 629  add 443 278  values 823  contains 489  add 464 20  count  contains 900  count  count  contains 490  count  count  count  count  contains 551  count  contains 836  contains 619  contains 91  add 99 882  count  add 738 980  contains 647  add 931 204  add 408 380  count  count  add 171 339  add 236 782  count  count  contains 891  values 191  values 895  values 522  count  values 383  contains 638  add 578 590  values 766  add 418 83  count  add 58 293  count  contains 447  count  add 878 316  contains 920  count  values 141  count  contains 304  add 681 855  contains 996  contains 784  values 593  contains 196  count  contains 950  count  add 748 781  values 573  add 422 180  count  add 67 189  contains 713  contains 449  count  add 895 356  count  contains 640  add 692 629  values 854  contains 848  count  contains 563  contains 276  add 359 552  add 60 638  contains 527  count  values 411  add 149 862  count  values 363  contains 593  values 659  add 720 204  values 454  contains 586  count  contains 332  contains 53  count  contains 90  values 18  values 718  values 20  add 131 281  contains 639  values 293  add 44 47  values 807  contains 991  contains 347  add 606 70  values 48  values 596  values 13  contains 230  add 949 344  values 875  values 638  values 588  values 381  values 576  count  count  contains 285  contains 246  values 640  count  contains 875  add 647 985  values 305  contains 495  contains 927  values 84  add 700 195  add 852 977  add 50 423  values 791  count  contains 621  count  count  add 766 892  contains 757  count  count  contains 227  values 666  contains 52  count  values 887  values 208  count  values 89  contains 394  values 591  count  add 113 437  add 364 349  add 224 366  values 35  add 326 653  add 573 866  values 311  count  values 994  values 903  contains 412  count  count  add 567 372  add 998 356  count  count  add 73 605  count  contains 828  add 50 852  contains 882  contains 642  contains 694  contains 531  add 403 82  add 533 474  values 51  contains 3  values 409  values 172  values 282  values 388  values 277  values 794  add 932 879  add 35 530  contains 771  contains 872  values 518  values 953  count  add 651 598  contains 264  add 825 263  contains 867  count  values 387  values 128  values 234  contains 386  add 149 303  count  count  count  count  values 298  values 549  count  count  add 992 702  contains 194  contains 729  values 344  contains 239  add 565 617  add 3 576  values 625  values 432  contains 139  values 169  add 230 840  add 526 338  add 399 116  values 394  add 391 707  contains 806  contains 889  count  add 297 873  values 183  values 721  values 923  count  values 296  values 833  contains 34  count  values 608  values 330  add 784 448  contains 845  values 184  count  add 174 829  values 658  values 872  count  count  contains 342  values 384  add 914 194  contains 541  add 825 672  add 917 993  add 151 916  contains 425  add 338 893  contains 689  values 310  add 465 195  add 693 748  values 232 | 0  0  0  0  0  1  1  False  2  False  2  False  2  2  False  False  False  3  False  4  False  False  False  False  False  False  10  False  10  11  11  False  False  False  12  False  False  13  14  15  16  False  False  False  False  False  False  False  20  False  20  887  20  20  False  False  False  False  False  20  21  False  False  False  False  23  False  True  24  False  False  False  False  26  False  26  26  26  26  False  False  31  32  32  False  False  33  33  33  33  33  33  False  False  34  34  False  False  35  False  14  False  864  False  40  False  False  42  42  44  False  44  False  False  False  45  45  False  False  False  False  False  False  False  49  49  False  False  False  False  False  52  53  False  False  False  56  False  56  56  False  56  56  56  58  False  60  False  False  64  64  False  64  False  False  False  False  False  68  68  False  68  68  True  False  72  False  72  75  77  77  77  77  False  325  77  77  False  77  False  79  80  False  80  False  True  True  83  False  False  False  True  85  False  85  491  86  86  False  False  False  False  89  89  90  91  False  91  91  False  True  93  93  96  False  97  False  False  False  False  True  False  100  False  100  False  101  False  101  101  False  False  False  102  494  102  414  False  True  False  105  105  106  False  107  109  204  110  False  False  110  True  110  False  False  111  False  False  True  False  78  False  False  119  False  119  False  120  120  False  120  120  True  False  121  False  558  842  121  False  False  False  121  True  121  True  121  121  False  False  121  False  122  125  False  125  125  False  False  False  False  False  False  150  True  True  False  377  False  126  126  False  False  132  False  132  132  133  133  False  False  133  False  134  134  134  134  False  134  True  135  135  135  False  False  False  135  135  138  138  True  False  139  False  139  True  True  141  142  False  143  False  144  144  False  145  False  54  146  False  False  149  False  False  152  152  False  False  False  153  153  153  False  False  154  155  155  False  155  155  155  False  True  False  156  False  156  156  True  156  156  156  156  True  156  False  False  False  157  False  160  160  162  162  True  162  False  162  162  False  162  False  162  162  False  False  False  False  163  False  163  164  True  False  165  166  False  False  167  False  False  False  169  170  False  False  171  False  True  171  False  153 426  False  False  False  False  174  174  False  False  174  False  False  False  177  False  177  177  False  178  178  False  False  178  178  False  178  183  False  183  183  185  185  185  True  False  False  False  False  514  False  False  False  187  False  False  189  193  True  189  189  189  189  189  189  True  False  False  False  False  False  196  494  197  False  197  962  False  198  199  199  False  True  False  False |
| Задача 7. Хеш-таблица с "кукувиче хеширане" | |
| **Условие**  Реализирайте хеш-таблица, която използва "кукувиче хеширане" с 3 хеш-функции за разрешаване на колизиите.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху хеш-талица, която съдържа целочислени ключове и стойности. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add k v –добавя запис в хеш-таблицата, като k е ключът, а v - стойността. Ако хеш-таблицата вече съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  find k –печата на конзолата на нов ред стойността, отговаряща на ключа k. Ако хеш-таблицата не съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  remove k – ако таблицата съдържа елемент с ключ k, го премахва, иначе печата на конзолата "False".  count – изписва на екрана съобщение "c", където c е броят записи в хеш-таблицата.  clear – изтрива всички елементи от множеството.  this k – печата на конзолата резултата от this[k], където k е ключ в хеш-таблицата. Ако хеш-таблицата не съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  keys - печата на конзолата всички ключове от хеш-таблицата на един ред, разделени с интервал, сортирани в нарастващ ред.  elements – печата на конзолата записите в хеш-таблицата, сортирани в нарстващ ред според ключа, като всеки запис се изписва на нов ред във формата "k v", където k и v са съответно ключът и стойността на записа.  Пример:  13  add 1 2  add 17 3  add 1 5  add 2 3  count  find 2  this 1  remove 12  remove 1  keys  elements  clear  count  Резултат:  False  3  3  2  False  2 17  2 3  17 3  0 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  За да удвоите размера на вашата колекция, можете да заделите двойно по-голям масив и да прехвърлите елементите от стария в новия, след което да насочите референцията от стария масив към новия. За да имплементирате foreachоператора върху вашата колекция, имплементирайте интерфейса IEnumerableи във вашия метод GetEnumerator()да връщате съответния метод GetEnumerator()на масива от списъци. Можете да използвате и оператора yield.  Можете за първа хеш-функция да ползвате GetHashCode() % size, за втора да ползвате (GetHashCode () \* 83 + 7) % size, a за трета – (GetHashCode () \* GetHashCode () + 19) % size). | |
| **Решение (сорс код)** | |
|  | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди   Могат да се използват същите тестове като в задача 8. | |
| Задача 8. Реализация на хеш-таблица | |
| **Условие**  Реализирайте структурата данни хеш-таблица в клас HashTable<K, T>. Пазете данните в масив от списъци от двойки ключ-стойност (List<KeyValuePair<K,T>>[]) с начален капацитет от 16 елемента. Когато хеш-таблиц­­ата ­­достигне 75% от своя капацитет да се удвоява капацитета. Реализирайте следните операции: Add(key, value), Find(key)🡪value, Remove(key), Count, Clear(), this[], Keys. Реализирайте и итериране по елементите на хеш-таблицата с foreach.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху хеш-талица, която съдържа целочислени ключове и стойности. За хеш-функция използвайте вградената в .NET. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add k v –добавя запис в хеш-таблицата, като k е ключът, а v - стойността. Ако хеш-таблицата вече съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  find k –печата на конзолата на нов ред стойността, отговаряща на ключа k. Ако хеш-таблицата не съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  remove k – ако таблицата съдържа елемент с ключ k, го премахва, иначе печата на конзолата "False".  count – изписва на екрана съобщение "c", където c е броят записи в хеш-таблицата.  clear – изтрива всички елементи от множеството.  this k – печата на конзолата резултата от this[k], където k е ключ в хеш-таблицата. Ако хеш-таблицата не съдържа запис с такъв ключ, на екрана се изписва "False" на нов ред.  keys - печата на конзолата всички ключове от хеш-таблицата на един ред, разделени с интервал, сортирани в нарастващ ред.  elements – печата на конзолата записите в хеш-таблицата, сортирани в нарстващ ред според ключа, като всеки запис се изписва на нов ред във формата "k v", където k и v са съответно ключът и стойността на записа.  Пример:  13  add 1 2  add 17 3  add 1 5  add 2 3  count  find 2  this 1  remove 12  remove 1  keys  elements  clear  count  Резултат:  False  3  3  2  False  2 17  2 3  17 3  0 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  За да удвоите размера на вашата колекция, можете да заделите двойно по-голям масив и да прехвърлите елементите от стария в новия, след което да насочите референцията от стария масив към новия. За да имплементирате foreachоператора върху вашата колекция, имплементирайте интерфейса IEnumerableи във вашия метод GetEnumerator()да връщате съответния метод GetEnumerator()на масива от списъци. Можете да използвате и оператора yield. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  using System.Text;  class HashTable<K, T> : IEnumerable<KeyValuePair<K, T>>  {  protected const int DefaultCapacity = 16;  protected const float LoadFactor = 0.75f;  protected List<KeyValuePair<K, T>>[] table;  protected int count;  protected int threshold;  protected int fullness;  public int Count  {  get  {  return this.count;  }  }  public T this[K key]  {  get  {  return this.Find(key);  }  set  {  this.Set(key, value);  }  }  public HashTable()  {  this.table = new List<KeyValuePair<K, T>>[DefaultCapacity];  this.count = 0;  this.fullness = 0;  unchecked  {  this.threshold = (int)(this.table.Length \* LoadFactor);  }  }  private void EnsureCapacity()  {  if (fullness >= threshold)  {  int newCapacity = this.table.Length \* 2;  this.threshold = (int)(newCapacity \* LoadFactor);  this.fullness = 0;  List<KeyValuePair<K, T>>[] oldTable = this.table;  this.table = new List<KeyValuePair<K, T>>[newCapacity];  foreach (List<KeyValuePair<K, T>> oldChain in oldTable)  {  if (oldChain != null)  {  foreach (KeyValuePair<K, T> pair in oldChain)  {  List<KeyValuePair<K, T>> chain = FindChain(pair.Key, true);  chain.Add(pair);  }  }  }  }  }  private List<KeyValuePair<K, T>> FindChain(K key, bool createIfMissing)  {  int keyHashCode = key.GetHashCode();  int index = keyHashCode % this.table.Length;  if (this.table[index] == null && createIfMissing)  {  this.table[index] = new List<KeyValuePair<K, T>>();  fullness++;  }  return this.table[index];  }  public bool Add(K key, T value)  {  T previousValue = Find(key);  if (!previousValue.Equals(default(T)))  {  return false;  }  EnsureCapacity();  KeyValuePair<K, T> pair = new KeyValuePair<K, T>(key, value);  List<KeyValuePair<K, T>> chain = FindChain(pair.Key, true);  chain.Add(pair);  count++;  return true;  }  public T Find(K key)  {  List<KeyValuePair<K, T>> chain = FindChain(key, false);  if (chain != null)  {  foreach (KeyValuePair<K, T> pair in chain)  {  if (pair.Key.Equals(key))  {  return pair.Value;  }  }  }  return default(T);  }  private void Set(K key, T value)  {  this.EnsureCapacity();  List<KeyValuePair<K, T>> chain = this.FindChain(key, true);  KeyValuePair<K, T> newEntry = new KeyValuePair<K, T>(key, value);  for (int i = 0; i < chain.Count; i++)  {  KeyValuePair<K, T> entry = chain[i];  if (entry.Key.Equals(key))  {  chain[i] = newEntry;  return;  }  }  chain.Add(newEntry);  this.count++;  }  public void Clear()  {  if (this.table != null)  {  this.table = new List<KeyValuePair<K, T>>[DefaultCapacity];  }  this.count = 0;  this.fullness = 0;  unchecked  {  this.threshold = (int)(this.table.Length \* LoadFactor);  }  }  public bool Remove(K key)  {  List<KeyValuePair<K, T>> chain = FindChain(key, false);  if (chain != null)  {  foreach (KeyValuePair<K, T> pair in chain)  {  if (pair.Key.Equals(key))  {  chain.Remove(pair);  return true;  }  }  }  return false;  }  IEnumerator<KeyValuePair<K, T>> IEnumerable<KeyValuePair<K, T>>.GetEnumerator()  {  foreach (List<KeyValuePair<K, T>> chain in this.table)  {  if (chain != null)  {  foreach (KeyValuePair<K, T> pair in chain)  {  yield return pair;  }  }  }  }  IEnumerator IEnumerable.GetEnumerator()  {  return ((IEnumerable<KeyValuePair<K, T>>)this).GetEnumerator();  }  public List<K> Keys()  {  List<K> keys = new List<K>();  foreach (List<KeyValuePair<K, T>> chain in this.table)  {  if (chain != null)  {  foreach (KeyValuePair<K, T> pair in chain)  {  keys.Add(pair.Key);  }  }  }  return keys;  }  }  class CommandExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  HashTable<int, int> table = new HashTable<int, int>();  ExecuteCommands(table);  Console.WriteLine(output.ToString().Trim());  }  private static void ExecuteCommands(HashTable<int, int> table)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, table);  }  }  private static void ExecuteCommands(string command, HashTable<int, int> table)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, table);  break;  case "find":  ExecuteFindCommand(tokens, table);  break;  case "remove":  ExecuteRemoveCommand(tokens, table);  break;  case "count":  ExecuteCountCommand(table);  break;  case "clear":  ExecuteClearCommand(table);  break;  case "this":  ExecuteThisCommand(tokens, table);  break;  case "keys":  ExecuteKeysCommand(table);  break;  case "elements":  ExecuteElementsCommand(table);  break;  default:  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteKeysCommand(HashTable<int, int> table)  {  List<int> keys = table.Keys();  SortedSet<int> sortedKeys = new SortedSet<int>();  foreach (int key in keys)  {  sortedKeys.Add(key);  }  StringBuilder buffer = new StringBuilder();  foreach (int key in sortedKeys)  {  buffer.AppendFormat("{0} ", key);  }  PrintLine(buffer.ToString());  }  private static void ExecuteThisCommand(string[] tokens, HashTable<int, int> table)  {  int key = int.Parse(tokens[1]);  int value = table[key];  if (value == 0)  {  PrintLine(false.ToString());  }  else  {  PrintLine(value.ToString());  }  }  private static void ExecuteAddCommand(string[] tokens, HashTable<int, int> table)  {  int key = int.Parse(tokens[1]);  int value = int.Parse(tokens[2]);  bool isAddSuccessful = table.Add(key, value);  if (!isAddSuccessful)  {  PrintLine(isAddSuccessful.ToString());  }  }  private static void ExecuteCountCommand(HashTable<int, int> table)  {  int count = table.Count;  PrintLine(count.ToString());  }  private static void ExecuteRemoveCommand(string[] tokens, HashTable<int, int> table)  {  int element = int.Parse(tokens[1]);  bool isRemoved = table.Remove(element);  if (!isRemoved)  {  PrintLine(isRemoved.ToString());  }  }  private static void ExecuteFindCommand(string[] tokens, HashTable<int, int> table)  {  int element = int.Parse(tokens[1]);  int value = table.Find(element);  if (value == 0)  {  PrintLine(false.ToString());  }  else  {  PrintLine(value.ToString());  }  }  private static void ExecuteClearCommand(HashTable<int, int> table)  {  table.Clear();  }  private static void ExecuteElementsCommand(HashTable<int, int> table)  {  KeyValueComparer<int, int> comparer = new KeyValueComparer<int, int>();  SortedSet<KeyValuePair<int, int>> set = new SortedSet<KeyValuePair<int, int>>(comparer);  foreach (var entry in table)  {  set.Add(entry);  }  StringBuilder buffer = new StringBuilder();  foreach (var entry in set)  {  buffer.AppendFormat("{0} {1}\n", entry.Key, entry.Value);  }  PrintLine(buffer.ToString().Trim());  }  }  class KeyValueComparer<K, T> : IComparer<KeyValuePair<K, T>> where K : IComparable  {  public int Compare(KeyValuePair<K, T> x, KeyValuePair<K, T> y)  {  int result = x.Key.CompareTo(y.Key);  return result;  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 13  add 1 2  add 17 3  add 1 5  add 2 3  count  find 2  this 1  remove 12  remove 1  keys  elements  clear  count | False  3  3  2  False  2 17  2 3  17 3  0 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 128  add 163 388  add 319 18  remove 910  add 520 485  clear  find 881  elements  remove 355  remove 943  keys  keys  this 819  add 56 741  keys  add 545 859  remove 371  count  keys  this 41  elements  add 949 991  keys  remove 438  keys  clear  clear  find 7  this 292  add 860 565  find 427  remove 344  remove 64  clear  find 221  remove 161  find 113  find 343  find 877  count  remove 302  elements  add 567 258  elements  count  count  clear  keys  count  remove 804  clear  keys  find 370  count  this 561  add 372 805  clear  elements  remove 714  count  count  keys  keys  keys  keys  keys  clear  clear  find 860  add 398 847  clear  add 361 823  add 356 659  remove 21  elements  this 180  keys  find 930  find 494  this 980  find 998  add 686 956  this 392  add 942 191  elements  clear  remove 299  this 428  remove 444  this 809  elements  add 169 397  elements  find 574  elements  clear  this 468  this 213  add 167 848  clear  remove 404  find 720  remove 717  add 22 463  count  elements  find 791  clear  this 752  keys  add 176 829  this 803  keys  add 400 427  remove 722  remove 296  find 131  keys  keys  elements  add 561 88  clear  remove 53  count  count  this 693  keys  keys  add 767 914 | False  False  False  False  False  56  False  2  56 545  False  56 741  545 859  56 545 949  False  56 545 949  False  False  False  False  False  False  False  False  False  False  0  False  567 258  1  1  0  False  False  0  False  False  0  0  False  False  356 659  361 823  False  356 361  False  False  False  False  False  356 659  361 823  686 956  942 191  False  False  False  False  169 397  False  169 397  False  False  False  False  False  1  22 463  False  False  False  176  False  False  False  176 400  176 400  176 829  400 427  False  0  0  False |
| **Вход** | **Изход** |
| 178  keys  add 90 821  keys  add 91 981  clear  this 641  add 455 297  count  count  find 470  clear  elements  elements  remove 867  add 531 737  clear  remove 49  keys  add 133 599  add 303 28  remove 655  clear  keys  find 970  elements  clear  clear  find 702  elements  this 87  clear  add 784 26  keys  clear  find 977  remove 126  count  keys  elements  this 715  clear  clear  count  elements  count  add 486 860  this 803  elements  count  remove 516  remove 34  this 605  elements  remove 937  remove 572  find 796  keys  remove 366  count  count  remove 38  find 885  add 717 309  elements  find 1  add 222 104  find 931  add 890 460  elements  add 757 220  elements  count  keys  find 941  find 197  clear  this 120  count  remove 478  elements  find 380  count  clear  this 695  count  elements  find 714  find 349  remove 687  elements  elements  count  count  this 104  add 685 107  elements  keys  add 763 618  remove 947  keys  keys  this 27  elements  clear  add 407 366  add 817 8  remove 63  elements  clear  elements  clear  clear  keys  this 984  clear  remove 834  clear  remove 502  keys  clear  elements  keys  this 244  keys  count  clear  find 802  count  keys  elements  add 595 286  add 388 43  add 183 155  remove 15  count  find 861  find 372  find 345  find 528  clear  this 130  add 303 53  find 514  elements  this 707  find 20  keys  elements  add 86 772  find 229  count  clear  count  this 769  remove 41  add 167 231  add 456 234  remove 366  remove 464  remove 757  remove 848  count  find 436  clear  elements  remove 426  elements  find 285  count  find 8  add 980 280  count  remove 986  add 187 347  keys  this 250  elements  this 410 | 90  False  1  1  False  False  False  False  False  False  False  784  False  False  0  False  0  0  False  486 860  1  False  False  False  486 860  False  False  False  486  False  1  1  False  False  486 860  717 309  False  False  222 104  486 860  717 309  890 460  222 104  486 860  717 309  757 220  890 460  5  222 486 717 757 890  False  False  False  0  False  False  0  False  0  False  False  False  0  0  False  685 107  685  False  685 763  685 763  False  685 107  763 618  False  407 366  817 8  False  False  False  False  0  False  0  False  3  False  False  False  False  False  False  303 53  False  False  303  303 53  False  2  0  False  False  False  False  False  False  2  False  False  False  0  False  1  False  187 980  False  187 347  980 280  False |
| **Вход** | **Изход** |
| 353  add 601 73  keys  find 67  elements  add 228 125  clear  clear  elements  find 776  add 483 181  add 238 110  find 41  keys  find 515  find 461  this 627  find 672  find 584  this 940  this 202  clear  remove 238  this 278  add 308 204  this 691  this 310  remove 123  remove 474  this 863  clear  remove 659  this 898  count  count  clear  elements  keys  remove 388  count  keys  count  remove 657  keys  add 461 906  elements  clear  elements  keys  count  this 363  remove 68  remove 743  elements  keys  count  count  clear  keys  count  keys  find 676  find 462  keys  remove 227  elements  elements  add 466 581  count  find 957  clear  this 720  keys  count  this 79  remove 864  clear  clear  count  this 455  elements  this 802  remove 222  remove 229  keys  add 90 515  find 871  count  find 601  this 268  this 843  keys  this 822  add 26 65  find 337  remove 946  find 843  clear  count  elements  remove 664  remove 252  elements  this 755  this 629  remove 171  keys  this 160  remove 767  remove 732  keys  this 340  elements  keys  remove 156  find 892  clear  add 853 672  this 450  count  keys  elements  count  add 789 115  add 944 192  this 854  find 480  find 9  find 892  add 744 756  clear  count  keys  elements  add 810 835  find 601  keys  this 486  count  find 328  remove 287  remove 942  this 628  count  this 123  count  elements  this 715  clear  elements  elements  clear  elements  this 885  count  add 499 920  elements  remove 840  remove 416  add 368 835  remove 848  this 891  clear  find 40  find 207  this 744  clear  find 161  add 644 679  keys  add 545 695  remove 926  remove 787  count  elements  count  keys  add 305 110  add 95 326  keys  keys  add 395 393  elements  clear  this 693  remove 951  keys  keys  find 195  this 601  elements  keys  find 50  elements  count  add 159 204  clear  remove 156  count  this 485  add 835 252  keys  this 419  this 645  find 594  find 929  keys  this 146  remove 591  count  this 196  find 956  remove 945  count  elements  find 188  remove 226  clear  remove 692  count  this 981  elements  count  add 181 209  find 10  count  this 499  remove 509  add 350 748  keys  this 437  find 113  clear  remove 342  this 184  clear  remove 903  add 941 237  remove 964  find 357  find 371  clear  elements  add 945 819  remove 936  this 726  find 934  count  keys  clear  remove 221  clear  count  clear  add 295 997  this 817  add 382 748  remove 897  clear  elements  elements  clear  count  find 450  find 167  this 50  count  add 458 385  count  count  remove 348  elements  find 391  this 756  add 75 524  remove 244  keys  count  clear  this 762  find 238  elements  elements  remove 416  keys  add 405 681  clear  this 233  clear  remove 392  this 60  count  remove 747  find 149  find 473  remove 652  find 937  remove 303  clear  this 298  remove 146  count  clear  elements  elements  find 110  elements  add 206 431  keys  elements  elements  keys  find 376  add 395 14  add 89 705  count  add 763 646  add 77 377  add 937 935  remove 161  elements  find 94  count  add 637 168  add 30 41  count  this 172  add 170 927  count  remove 283  find 57  keys  add 934 168  clear  add 907 684  find 493  elements  this 823  elements  elements  remove 640  remove 377  keys  add 675 388  clear  add 474 15  elements  count  clear  clear  this 12  add 129 68  find 299  clear | 601  False  601 73  False  False  238 483  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  0  0  False  0  0  False  461 906  0  False  False  False  0  0  0  False  False  False  1  False  False  0  False  False  0  False  False  False  False  False  1  False  False  False  90  False  False  False  False  0  False  False  False  False  False  False  False  False  False  False  False  False  1  853  853 672  1  False  False  False  False  0  False  810  False  1  False  False  False  False  1  False  1  810 835  False  False  0  499 920  False  False  False  False  False  False  False  False  644  False  False  2  545 695  644 679  2  545 644  95 305 545 644  95 305 545 644  95 326  305 110  395 393  545 695  644 679  False  False  False  False  False  0  False  0  False  835  False  False  False  False  835  False  False  1  False  False  False  1  835 252  False  False  False  0  False  0  False  1  False  False  181 350  False  False  False  False  False  False  False  False  False  False  False  1  945  False  0  False  False  0  False  False  False  0  1  1  False  458 385  False  False  False  75 458  2  False  False  False  False  False  False  0  False  False  False  False  False  False  False  False  0  False  206  206 431  206 431  206  False  3  False  77 377  89 705  206 431  395 14  763 646  937 935  False  6  8  False  9  False  False  30 77 89 170 206 395 637 763 937  False  907 684  False  907 684  907 684  False  False  907  474 15  1  False  False |
| **Вход** | **Изход** |
| 376  find 541  this 289  find 58  find 601  remove 11  find 570  this 194  find 773  find 548  elements  remove 420  count  remove 535  elements  count  remove 195  clear  clear  remove 906  find 0  remove 262  this 887  find 464  elements  count  elements  this 777  keys  keys  add 116 533  this 999  this 843  count  keys  find 107  count  keys  this 10  add 794 752  find 325  this 888  elements  add 291 322  count  count  elements  count  this 757  add 666 282  add 63 856  remove 254  count  clear  clear  add 590 481  count  keys  elements  count  find 977  clear  count  add 186 204  count  count  this 156  count  count  remove 555  remove 333  find 419  elements  elements  elements  count  elements  elements  add 351 832  count  keys  elements  this 426  clear  remove 650  find 587  clear  add 875 604  count  clear  add 938 40  find 523  find 147  remove 343  add 508 236  count  clear  clear  elements  keys  remove 974  clear  keys  count  add 980 32  elements  find 746  clear  remove 55  remove 458  elements  elements  elements  add 127 309  find 662  clear  count  count  add 45 165  this 24  clear  remove 504  this 912  keys  this 900  add 191 618  add 400 706  add 966 172  keys  clear  this 577  elements  this 62  this 904  find 35  this 972  elements  this 470  this 989  add 551 706  clear  add 210 84  add 936 691  find 261  elements  remove 438  keys  remove 590  elements  count  this 554  count  elements  add 657 638  remove 87  find 877  this 678  this 958  count  count  find 473  count  count  elements  keys  remove 596  this 234  this 194  find 719  find 481  remove 317  clear  add 807 538  count  clear  keys  elements  this 813  count  clear  find 410  add 370 34  add 527 953  keys  keys  add 302 364  count  elements  add 951 484  this 157  count  count  count  remove 658  this 29  elements  this 970  add 557 100  add 35 256  find 766  this 31  elements  remove 540  this 37  clear  find 20  clear  this 974  find 84  remove 178  keys  elements  this 711  remove 87  this 276  keys  this 513  find 303  count  this 901  find 799  this 204  add 859 728  remove 154  clear  add 290 933  elements  keys  count  keys  elements  find 298  count  add 344 943  remove 45  this 976  clear  remove 870  this 883  keys  keys  count  count  find 96  elements  find 447  clear  keys  add 347 342  keys  elements  add 439 421  find 417  count  find 455  keys  elements  add 124 752  this 852  this 377  count  add 205 342  add 628 784  remove 68  add 498 524  keys  elements  this 923  add 483 862  count  count  count  count  this 992  this 244  add 815 476  this 704  find 700  elements  remove 605  clear  elements  keys  this 855  remove 437  this 931  elements  elements  remove 200  this 260  elements  find 898  elements  this 545  remove 449  count  this 481  clear  remove 794  remove 165  add 450 318  count  clear  add 811 624  add 959 28  add 748 322  this 614  this 441  this 969  keys  add 557 59  remove 505  count  elements  remove 757  find 837  clear  this 896  elements  elements  remove 732  elements  count  remove 823  this 517  remove 701  add 0 867  keys  keys  add 383 363  add 893 258  find 23  clear  elements  remove 358  keys  find 483  add 426 841  this 418  this 776  clear  clear  find 823  clear  elements  keys  remove 910  clear  elements  remove 758  find 358  keys  elements  clear  find 708  remove 488  add 464 907  remove 806  this 634  find 136  count  find 302  keys  keys  keys  add 715 171  find 257  elements  this 447  clear  count  remove 668  clear  keys  add 237 0  count  add 506 713 | False  False  False  False  False  False  False  False  False  False  0  False  0  False  False  False  False  False  False  0  False  False  False  1  116  False  1  116  False  False  False  116 533  794 752  3  3  116 533  291 322  794 752  3  False  False  5  1  590  590 481  1  False  0  1  1  False  1  1  False  False  False  186 204  186 204  186 204  1  186 204  186 204  2  186 351  186 204  351 832  False  False  False  1  False  False  False  2  False  0  980 32  False  False  False  False  0  0  False  False  False  False  191 400 966  False  False  False  False  False  False  False  False  210 84  936 691  False  210 936  False  210 84  936 691  2  False  2  210 84  936 691  False  False  False  False  3  3  False  3  3  210 84  657 638  936 691  210 657 936  False  False  False  False  False  False  1  False  0  False  370 527  370 527  3  302 364  370 34  527 953  False  4  4  4  False  False  302 364  370 34  527 953  951 484  False  False  False  35 256  302 364  370 34  527 953  557 100  951 484  False  False  False  False  False  False  False  False  False  False  False  0  False  False  False  False  290 933  290  1  290  290 933  False  1  False  False  False  False  0  0  False  False  347  347 342  False  2  False  347 439  347 342  439 421  False  False  3  False  124 205 347 439 498 628  124 752  205 342  347 342  439 421  498 524  628 784  False  7  7  7  7  False  False  False  False  124 752  205 342  347 342  439 421  483 862  498 524  628 784  815 476  False  False  False  False  False  False  False  False  False  0  False  False  False  1  False  False  False  748 811 959  False  4  557 59  748 322  811 624  959 28  False  False  False  False  0  False  False  False  0  0  False  False  False  False  False  False  False  False  False  False  False  False  False  False  1  False  464  464  464  False  464 907  715 171  False  0  False  1 |
| **Вход** | **Изход** |
| 301  count  remove 727  clear  clear  clear  find 585  keys  find 812  remove 530  remove 447  this 276  keys  keys  keys  remove 839  find 809  elements  this 250  count  remove 463  keys  count  this 55  find 473  find 997  add 780 984  elements  count  find 347  add 587 256  count  find 425  add 53 32  find 632  add 918 677  elements  remove 692  find 319  count  remove 638  count  find 974  count  remove 759  add 821 382  count  add 461 895  add 994 56  find 38  keys  count  this 917  clear  count  remove 319  add 465 291  this 70  keys  add 405 112  add 453 677  find 244  add 211 756  find 47  count  keys  keys  remove 635  add 281 515  elements  elements  clear  this 587  find 958  this 546  clear  this 378  remove 443  count  add 876 603  clear  elements  clear  count  count  find 328  remove 803  clear  remove 144  this 692  keys  remove 119  count  clear  count  keys  count  find 607  count  this 111  keys  keys  add 291 803  count  add 520 389  elements  clear  count  count  remove 248  count  count  remove 402  keys  elements  clear  add 323 36  count  count  this 45  this 12  elements  keys  add 524 564  keys  find 513  this 624  find 400  remove 609  elements  find 194  clear  add 766 286  add 809 159  find 752  this 255  remove 59  remove 474  this 883  clear  this 345  keys  this 605  find 807  this 248  keys  find 665  this 61  remove 189  add 962 937  this 801  elements  elements  remove 811  add 990 154  this 330  this 714  count  elements  remove 814  count  elements  count  clear  count  count  clear  count  add 86 975  find 72  keys  find 511  this 157  keys  this 455  count  keys  clear  find 652  add 918 81  count  find 721  keys  count  keys  find 485  remove 247  count  count  clear  remove 725  add 797 82  keys  find 185  elements  remove 177  clear  remove 956  add 971 408  keys  remove 642  remove 553  elements  remove 421  clear  add 986 25  count  elements  count  remove 944  find 146  count  count  clear  remove 761  elements  clear  elements  clear  find 112  keys  add 514 937  count  add 780 212  this 831  keys  count  count  this 170  find 564  count  keys  remove 413  keys  elements  clear  add 255 36  elements  count  add 15 710  find 488  remove 861  clear  count  count  remove 499  this 457  remove 510  add 89 622  clear  this 942  count  keys  elements  this 39  find 924  elements  find 47  elements  keys  this 816  find 139  elements  count  remove 649  add 916 456  keys  this 314  clear  add 10 166  count  remove 665  add 543 941  remove 789  remove 653  clear  clear  remove 270  clear  elements  keys  count  remove 871  add 243 281  add 843 555  remove 70  add 724 607  keys  elements  elements  this 608  find 577  remove 218  keys  find 128  this 62  clear  clear  find 208  keys  clear  add 728 139 | 0  False  False  False  False  False  False  False  False  False  0  False  0  False  False  False  780 984  1  False  2  False  False  53 32  587 256  780 984  918 677  False  False  4  False  4  False  4  False  5  False  53 461 587 780 821 918 994  7  False  0  False  False  465  False  False  4  211 405 453 465  211 405 453 465  False  211 756  281 515  405 112  453 677  465 291  211 756  281 515  405 112  453 677  465 291  False  False  False  False  False  0  0  0  False  False  False  False  False  0  0  0  False  0  False  1  291 803  520 389  0  0  False  0  0  False  1  1  False  False  323 36  323  323 524  False  False  False  False  323 36  524 564  False  False  False  False  False  False  False  False  False  False  False  False  False  False  962 937  962 937  False  False  False  2  962 937  990 154  False  2  962 937  990 154  2  0  0  0  False  86  False  False  86  False  1  86  False  1  False  918  1  918  False  False  1  1  False  797  False  797 82  False  False  971  False  False  971 408  False  1  986 25  1  False  False  1  1  False  False  1  False  514 780  2  2  False  False  2  514 780  False  514 780  514 937  780 212  255 36  1  False  False  0  0  False  False  False  False  0  False  False  False  False  False  0  False  916  False  1  False  False  False  False  0  False  False  243 724 843  243 281  724 607  843 555  243 281  724 607  843 555  False  False  False  243 724 843  False  False  False |
| **Вход** | **Изход** |
| 790  remove 145  remove 994  this 343  keys  keys  this 741  count  clear  remove 832  this 503  keys  add 593 171  remove 795  find 146  remove 34  this 111  add 461 333  count  keys  clear  add 130 94  clear  remove 743  elements  clear  this 854  count  clear  keys  count  this 35  count  add 592 31  add 569 921  find 678  clear  this 742  keys  find 407  elements  this 828  keys  clear  count  find 756  keys  remove 767  add 369 673  keys  remove 287  count  add 40 284  keys  keys  clear  count  find 903  elements  this 112  find 735  clear  count  count  keys  elements  clear  find 626  find 293  this 743  find 484  clear  clear  elements  remove 344  remove 768  find 122  find 889  remove 364  count  clear  remove 30  this 146  add 540 922  find 7  remove 676  find 389  keys  elements  add 92 267  elements  this 386  add 379 768  keys  elements  count  remove 343  elements  this 246  keys  add 947 262  add 597 215  elements  this 329  keys  add 667 131  count  remove 131  add 797 46  count  this 119  find 650  elements  remove 65  add 598 845  add 685 430  count  remove 876  this 98  count  add 19 27  add 180 350  add 643 588  add 192 303  add 584 847  add 1 731  clear  add 225 149  keys  add 483 767  remove 236  this 109  count  count  elements  remove 994  count  this 61  add 300 869  this 476  add 405 541  add 100 583  count  remove 144  add 63 269  elements  find 996  clear  count  add 864 995  count  this 790  remove 802  clear  count  remove 939  this 311  find 497  this 813  this 942  keys  find 653  find 841  remove 285  elements  add 91 181  this 488  clear  remove 5  this 996  remove 615  find 199  clear  add 139 328  count  keys  elements  keys  find 384  remove 631  this 761  find 807  this 404  clear  count  keys  count  remove 613  count  add 16 159  keys  this 490  add 762 566  this 538  add 512 833  count  elements  remove 862  keys  remove 857  elements  clear  keys  elements  remove 917  add 695 428  add 829 526  elements  count  keys  this 6  clear  elements  remove 868  add 27 672  keys  find 570  add 505 510  this 488  remove 593  add 484 365  keys  remove 573  elements  add 137 724  this 521  this 457  this 239  remove 309  elements  elements  elements  elements  clear  add 166 232  remove 83  find 918  remove 341  find 283  remove 304  remove 166  find 320  count  keys  elements  remove 964  find 490  add 335 265  remove 327  clear  remove 605  find 979  find 673  add 225 816  elements  find 350  remove 273  remove 177  count  keys  add 74 582  clear  find 954  find 158  elements  this 234  this 923  this 46  keys  elements  this 81  remove 131  count  find 94  this 924  this 951  clear  elements  find 935  elements  count  find 252  add 788 418  find 776  add 744 343  elements  add 953 556  remove 610  remove 674  add 61 734  clear  elements  count  keys  remove 230  remove 560  elements  clear  remove 799  clear  count  keys  keys  find 260  keys  clear  add 747 805  add 574 970  find 647  elements  this 464  keys  elements  this 572  remove 514  elements  find 14  clear  clear  keys  this 693  remove 429  add 510 857  find 413  remove 512  this 848  add 384 296  remove 63  clear  clear  remove 140  count  elements  keys  elements  count  find 241  add 821 22  clear  elements  add 410 304  clear  add 137 128  count  add 579 375  elements  this 206  find 619  keys  elements  elements  elements  count  clear  find 358  clear  find 42  clear  elements  remove 437  count  find 880  add 974 991  keys  elements  count  count  keys  add 878 535  elements  find 261  add 621 242  keys  add 575 516  count  find 946  elements  elements  add 509 539  this 142  elements  keys  keys  find 155  this 109  elements  count  clear  clear  clear  remove 822  this 945  keys  clear  remove 65  clear  count  clear  remove 588  keys  add 781 996  remove 936  remove 348  this 649  add 352 110  elements  elements  find 878  this 72  elements  elements  keys  add 282 17  remove 998  find 675  clear  count  find 480  clear  remove 582  remove 995  add 566 270  find 618  find 617  clear  this 557  remove 932  this 745  clear  count  this 977  elements  count  elements  add 937 87  this 161  find 846  keys  clear  clear  count  keys  elements  clear  clear  this 795  find 950  this 423  this 441  elements  this 886  keys  this 43  elements  count  this 828  add 29 629  find 487  count  add 770 722  add 961 902  find 805  find 11  keys  keys  keys  elements  keys  clear  count  count  find 931  remove 402  find 827  clear  find 750  elements  keys  clear  elements  count  remove 746  elements  elements  this 522  count  add 614 81  clear  this 262  add 604 689  elements  count  clear  find 14  clear  find 616  this 894  clear  this 152  find 938  this 135  remove 528  add 39 939  keys  elements  add 150 316  find 840  count  clear  clear  clear  add 980 405  elements  this 458  keys  clear  remove 262  keys  add 735 864  count  find 903  clear  elements  clear  clear  this 56  clear  this 118  keys  find 987  keys  find 329  elements  find 91  find 533  this 394  keys  keys  count  this 676  add 871 280  remove 854  add 936 883  clear  elements  add 411 924  keys  find 623  clear  clear  clear  clear  add 477 34  clear  keys  remove 610  find 165  add 790 113  elements  count  clear  keys  keys  clear  count  elements  keys  remove 718  add 95 680  find 735  clear  keys  remove 262  elements  find 601  clear  keys  this 512  clear  count  keys  this 505  find 923  count  clear  find 324  keys  add 128 640  this 770  keys  add 507 92  add 874 589  count  keys  clear  find 737  keys  elements  add 159 65  keys  count  add 586 212  keys  find 193  this 498  find 985  find 133  find 487  keys  keys  keys  find 419  clear  clear  find 323  this 638  this 749  keys  find 303  this 951  remove 142  this 183  clear  find 334  elements  remove 375  remove 409  clear  count  elements  find 946  find 192  elements  this 305  elements  keys  remove 558  find 477  count  elements  remove 938  remove 285  keys  add 847 648  remove 680  keys  clear  find 190  keys  elements  add 244 712  count  keys  add 110 638  remove 0  find 772  elements  elements  elements  keys  count  count  add 410 50  remove 566  elements  count  remove 914  clear  find 124  find 741  add 348 518  elements  keys  elements  add 186 827  this 978  keys  elements  add 727 277  keys  elements  add 761 67  count  keys  this 677  keys  add 522 151  clear  count  find 866  count  this 572  count  elements  add 512 296  elements  clear  remove 350  this 989  remove 570  this 757  find 60  remove 673  clear  count  keys  remove 932  keys  clear  add 227 234  keys  elements  count  remove 155  keys  keys  elements  clear  count  find 849  clear  remove 938  keys  keys  elements  clear  keys  remove 121  count  keys  find 87  this 648  find 666  this 901  remove 96  clear  keys  clear  elements  count  keys  elements  remove 507  elements  clear  this 951  count  remove 89  add 640 519  count  elements  this 466  this 174  add 146 157  this 885  keys  find 495  count  keys  find 275  keys  clear  this 891  add 613 585  remove 411  find 213  remove 70  clear  add 381 968  find 876  remove 941  keys  remove 682  keys  clear  clear  find 310  find 514  this 202  keys  remove 104  keys  count  elements  add 881 371  keys  elements  elements  keys  this 292  this 849 | False  False  False  False  0  False  False  False  False  False  False  2  461 593  False  False  0  0  False  0  False  False  False  False  0  False  False  369  False  1  40 369  40 369  0  False  False  False  0  0  False  False  False  False  False  False  False  False  False  0  False  False  False  False  False  540  540 922  92 267  540 922  False  92 379 540  92 267  379 768  540 922  3  False  92 267  379 768  540 922  False  92 379 540  92 267  379 768  540 922  597 215  947 262  False  92 379 540 597 947  6  False  7  False  False  92 267  379 768  540 922  597 215  667 131  797 46  947 262  False  9  False  False  9  225  False  False  2  2  225 149  483 767  False  2  False  False  5  False  63 269  100 583  225 149  300 869  405 541  483 767  False  0  1  False  False  0  False  False  False  False  False  False  False  False  False  False  False  False  False  1  139  139 328  139  False  False  False  False  False  0  0  False  0  16  False  False  3  16 159  512 833  762 566  False  16 512 762  False  16 159  512 833  762 566  False  695 428  829 526  2  695 829  False  False  27  False  False  False  27 484 505  False  27 672  484 365  505 510  False  False  False  False  27 672  137 724  484 365  505 510  27 672  137 724  484 365  505 510  27 672  137 724  484 365  505 510  27 672  137 724  484 365  505 510  False  False  False  False  False  False  1  False  False  False  False  False  False  225 816  False  False  False  1  225  False  False  False  False  False  False  False  0  False  False  False  False  0  False  False  744 343  788 418  False  False  0  False  False  False  0  False  False  574 970  747 805  False  574 747  574 970  747 805  False  False  574 970  747 805  False  False  False  False  False  False  False  False  0  0  False  1  137 128  579 375  False  False  137 579  137 128  579 375  137 128  579 375  137 128  579 375  2  False  False  False  0  False  974  974 991  1  1  974  878 535  974 991  False  621 878 974  4  False  575 516  621 242  878 535  974 991  575 516  621 242  878 535  974 991  False  509 539  575 516  621 242  878 535  974 991  509 575 621 878 974  509 575 621 878 974  False  False  509 539  575 516  621 242  878 535  974 991  5  False  False  False  0  False  False  False  False  352 110  781 996  352 110  781 996  False  False  352 110  781 996  352 110  781 996  352 781  False  False  0  False  False  False  False  False  False  False  False  0  False  0  False  False  937  0  False  False  False  False  False  False  0  False  False  1  False  False  29 770 961  29 770 961  29 770 961  29 629  770 722  961 902  29 770 961  0  0  False  False  False  False  0  False  False  0  False  604 689  1  False  False  False  False  False  False  False  39  39 939  False  2  980 405  False  980  False  1  False  False  False  False  False  False  False  False  0  False  False  411  False  False  False  790 113  1  0  False  False  False  False  False  0  False  False  0  False  False  128  3  128 507 874  False  159  1  159 586  False  False  False  False  False  159 586  159 586  159 586  False  False  False  False  False  False  False  False  False  False  False  0  False  False  False  False  False  0  False  False  False  847  False  1  244  False  False  110 638  244 712  110 638  244 712  110 638  244 712  110 244  2  2  False  110 638  244 712  410 50  3  False  False  False  348 518  348  348 518  False  186 348  186 827  348 518  186 348 727  186 827  348 518  727 277  4  186 348 727 761  False  186 348 727 761  0  False  0  False  0  512 296  False  False  False  False  False  False  0  False  227  227 234  1  False  227  227  227 234  0  False  False  False  0  False  False  False  False  False  0  False  False  0  False  1  640 519  False  False  False  146 640  False  2  146 640  False  146 640  False  False  False  False  False  False  381  False  381  False  False  False  False  0  881  881 371  881 371  881  False  False |
| **Вход** | **Изход** |
| 863  add 49 426  clear  remove 433  keys  find 206  count  keys  this 448  clear  clear  count  remove 887  count  clear  elements  add 284 145  count  this 865  keys  keys  remove 776  remove 358  add 107 63  clear  clear  count  remove 814  remove 231  count  remove 792  count  elements  clear  remove 88  add 439 847  clear  add 765 281  add 646 567  elements  count  elements  this 460  count  remove 511  clear  keys  this 491  add 741 685  keys  keys  elements  this 172  elements  remove 523  find 652  keys  clear  count  add 298 242  count  this 782  keys  keys  remove 756  keys  count  add 382 6  count  remove 633  count  add 896 208  elements  count  count  count  clear  this 886  keys  add 608 871  keys  count  find 613  remove 741  remove 913  keys  clear  add 99 248  add 589 245  add 812 18  count  count  clear  keys  remove 853  elements  remove 186  add 981 494  this 184  clear  find 927  keys  keys  add 891 130  find 78  this 909  remove 210  count  add 490 763  elements  add 149 466  remove 606  elements  keys  remove 465  add 820 836  add 363 914  this 834  this 458  remove 762  find 328  find 525  find 429  clear  keys  keys  find 602  find 521  this 35  add 971 321  elements  add 719 426  add 373 241  clear  clear  count  clear  clear  remove 31  count  find 924  keys  remove 738  count  count  find 569  clear  elements  find 618  clear  this 879  this 863  remove 551  remove 43  this 274  keys  remove 620  elements  find 259  remove 835  clear  keys  remove 710  find 816  find 916  count  keys  find 832  find 155  clear  add 817 496  keys  this 3  count  add 166 223  clear  count  count  keys  clear  add 309 290  add 646 827  find 18  this 819  this 423  add 480 893  keys  add 681 660  clear  add 692 394  clear  keys  add 674 144  count  this 399  keys  find 889  keys  keys  clear  add 509 795  keys  keys  keys  add 75 579  count  this 273  remove 429  this 794  find 501  remove 915  this 228  clear  find 88  clear  elements  count  keys  remove 205  this 53  remove 18  find 865  keys  remove 860  remove 520  remove 703  add 871 131  find 663  elements  elements  count  clear  elements  keys  keys  elements  this 714  remove 836  clear  find 288  find 975  find 28  count  clear  elements  count  find 456  clear  find 975  keys  add 216 398  keys  keys  keys  remove 817  find 128  count  find 218  find 67  elements  add 725 297  elements  clear  add 651 103  keys  add 53 515  find 48  remove 672  elements  add 529 497  keys  add 866 352  elements  remove 820  add 549 262  remove 707  remove 237  count  keys  elements  add 328 49  clear  remove 928  this 816  keys  this 106  keys  keys  remove 118  this 569  find 944  keys  elements  add 160 243  clear  clear  clear  keys  remove 164  elements  clear  clear  keys  elements  keys  count  elements  clear  find 207  clear  add 698 713  remove 742  add 227 14  keys  add 487 980  elements  elements  find 806  add 742 362  elements  count  this 748  count  remove 10  remove 346  find 637  clear  keys  this 408  elements  count  clear  find 810  clear  clear  remove 383  keys  find 539  keys  elements  clear  this 925  keys  keys  remove 66  count  elements  find 71  this 634  elements  keys  find 555  this 327  clear  add 705 277  keys  elements  keys  count  find 295  elements  remove 710  find 467  this 540  this 722  add 349 341  clear  clear  remove 166  add 924 646  clear  find 251  count  find 342  keys  elements  count  find 900  elements  elements  elements  add 7 862  remove 587  find 138  remove 433  keys  this 978  find 491  find 971  clear  keys  elements  this 604  add 689 924  count  keys  clear  keys  find 553  keys  add 424 411  count  clear  count  keys  count  keys  clear  remove 805  count  keys  find 161  count  this 424  clear  add 103 193  remove 57  remove 938  keys  keys  clear  remove 115  elements  add 662 553  keys  add 686 528  keys  remove 123  find 332  remove 270  find 265  this 208  find 720  elements  keys  elements  find 86  remove 187  clear  elements  this 182  find 157  elements  count  add 679 392  remove 19  elements  keys  this 980  elements  elements  keys  add 765 596  find 366  find 394  elements  find 742  remove 682  this 499  add 853 656  elements  add 175 325  keys  add 585 249  elements  add 824 239  add 939 262  add 561 139  this 346  clear  keys  add 762 43  find 345  remove 709  clear  clear  keys  elements  add 39 958  keys  count  find 679  add 893 474  add 569 643  find 803  add 588 136  remove 284  clear  add 125 955  count  remove 689  this 228  clear  remove 596  elements  remove 65  elements  remove 277  add 954 59  remove 671  remove 16  find 400  add 542 297  add 483 161  clear  count  elements  elements  add 403 199  count  elements  keys  remove 203  count  clear  remove 77  elements  keys  remove 55  count  find 171  count  keys  elements  find 881  this 197  elements  count  keys  count  remove 936  find 985  remove 873  elements  count  add 553 317  find 574  clear  add 951 639  clear  keys  count  keys  remove 225  clear  find 64  find 317  keys  this 850  elements  count  add 255 372  elements  elements  count  count  find 945  add 618 102  this 364  this 790  this 557  count  clear  remove 679  elements  this 613  keys  find 690  clear  clear  count  this 382  this 567  remove 718  add 722 86  remove 252  keys  remove 607  count  count  this 536  clear  find 184  count  remove 54  remove 256  this 334  add 218 746  clear  remove 728  elements  this 923  keys  remove 71  this 835  remove 234  add 868 739  add 200 371  clear  find 36  count  find 243  add 668 239  add 57 668  this 868  this 641  count  clear  this 693  clear  elements  find 455  count  remove 155  add 945 459  clear  clear  find 689  this 591  clear  keys  clear  this 664  remove 556  remove 13  add 173 436  clear  count  count  find 410  clear  keys  this 944  clear  add 842 87  elements  this 780  clear  count  clear  elements  find 34  add 665 994  add 28 304  remove 946  count  count  find 719  count  count  add 307 148  this 877  add 647 993  this 693  clear  this 532  keys  this 514  clear  find 250  clear  count  this 213  count  count  clear  remove 997  find 690  this 368  count  find 700  find 350  elements  add 135 387  add 917 301  count  remove 771  clear  find 926  elements  elements  count  elements  add 367 94  keys  find 370  keys  this 854  add 27 214  find 289  add 477 164  clear  add 114 185  remove 795  elements  elements  find 735  this 767  find 808  this 899  clear  find 332  find 590  keys  this 370  this 219  keys  remove 224  add 482 494  keys  keys  remove 865  remove 725  keys  clear  find 811  elements  this 50  elements  this 249  remove 315  this 124  this 332  clear  keys  count  this 448  add 935 639  this 51  remove 220  add 449 521  keys  clear  keys  count  keys  elements  keys  keys  add 320 854  clear  clear  elements  elements  count  remove 751  count  find 448  count  clear  remove 647  this 542  add 943 380  keys  keys  find 727  clear  keys  keys  this 983  remove 794  add 294 423  clear  clear  remove 700  keys  clear  elements  count  clear  remove 73  remove 934  clear  keys  add 420 693  keys  this 490  elements  count  elements  count  find 623  this 767  add 394 372  find 186  this 118  remove 842  remove 334  count  remove 271  elements  this 162  keys  remove 952  keys  elements  add 256 585  elements  clear  find 443  remove 678  elements  remove 701  clear  keys  this 158  this 879  this 811  clear  count  count  find 128  this 449  find 268  remove 368  this 907  add 293 115  clear  remove 76  elements  keys  clear  clear  remove 229  this 727  add 952 4  add 375 308  add 369 677  keys  remove 804  elements  this 215  add 377 616  clear  keys  count  clear  clear  clear  count  keys  this 942  add 832 135  elements  count  elements  count  remove 263  find 993  count  keys  this 616  remove 239  count  find 276  this 571  find 731  this 866  remove 497  remove 446  clear  clear  this 106  remove 845 | False  False  0  False  0  False  0  1  False  284  284  False  False  0  False  False  0  False  0  False  646 567  765 281  2  646 567  765 281  False  2  False  False  741  741  741 685  False  741 685  False  False  741  0  1  False  298  298  False  298  1  2  False  2  298 242  382 6  896 208  3  3  3  False  608  1  False  False  False  608  3  3  False  False  False  False  False  False  False  1  490 763  891 130  False  149 466  490 763  891 130  149 490 891  False  False  False  False  False  False  False  False  False  False  971 321  0  False  0  False  False  0  0  False  False  False  False  False  False  False  False  False  False  False  False  False  0  False  False  817  False  1  0  0  False  False  False  309 480 646  1  False  674  False  674  674  509  509  509  2  False  False  False  False  False  False  False  0  False  False  False  False  False  False  False  False  871 131  871 131  1  False  False  False  False  False  0  0  False  False  216  216  216  False  False  1  False  False  216 398  216 398  725 297  651  False  False  53 515  651 103  53 529 651  53 515  529 497  651 103  866 352  False  False  False  5  53 529 549 651 866  53 515  529 497  549 262  651 103  866 352  False  False  False  False  False  False  False  0  False  False  227 698  227 14  487 980  698 713  227 14  487 980  698 713  False  227 14  487 980  698 713  742 362  4  False  4  False  False  False  False  0  False  False  False  False  False  0  False  False  False  False  705  705 277  705  1  False  705 277  False  False  False  False  False  False  0  False  0  False  False  False  False  7  False  False  False  False  1  689  False  1  0  0  False  0  False  0  False  False  False  103  103  False  662  662 686  False  False  False  False  False  False  662 553  686 528  662 686  662 553  686 528  False  False  False  False  0  False  679 392  679  False  679 392  679 392  679  False  False  679 392  765 596  False  False  False  679 392  765 596  853 656  175 679 765 853  175 325  585 249  679 392  765 596  853 656  False  False  False  39  1  False  False  False  1  False  False  False  False  False  False  False  False  0  1  403 199  403  False  1  False  False  0  False  0  False  False  0  0  False  False  False  0  False  0  False  False  False  False  0  255 372  255 372  1  1  False  False  False  False  2  False  False  False  0  False  False  False  False  722  False  1  1  False  False  0  False  False  False  False  False  False  False  False  False  0  False  False  False  2  False  False  0  False  False  False  False  False  False  0  0  False  False  842 87  False  0  False  False  2  2  False  2  2  False  False  False  False  False  0  False  0  0  False  False  False  0  False  False  2  False  False  0  367  False  367  False  False  False  114 185  114 185  False  False  False  False  False  False  False  False  False  482  482  False  False  482  False  False  False  False  False  False  0  False  False  False  449 935  0  0  False  0  False  0  False  False  943  943  False  False  False  False  0  False  False  420  False  420 693  1  420 693  1  False  False  False  False  False  False  2  False  394 372  420 693  False  394 420  False  394 420  394 372  420 693  256 585  394 372  420 693  False  False  False  False  False  False  0  0  False  False  False  False  False  False  False  False  369 375 952  False  369 677  375 308  952 4  False  0  0  False  832 135  1  832 135  1  False  False  1  832  False  False  1  False  False  False  False  False  False  False  False |
| **Вход** | **Изход** |
| 1000  elements  find 670  elements  this 78  keys  clear  add 794 587  clear  this 541  this 538  add 368 329  keys  remove 40  find 18  add 876 371  keys  remove 789  add 114 807  count  count  elements  this 889  remove 882  this 956  add 932 485  remove 528  this 471  find 69  count  keys  keys  elements  elements  add 651 900  keys  this 40  remove 276  keys  count  keys  find 123  keys  keys  find 67  count  find 321  elements  find 533  this 348  this 331  add 720 629  remove 974  clear  clear  keys  add 989 486  find 604  clear  keys  find 12  clear  remove 529  this 379  keys  remove 348  clear  clear  elements  keys  add 192 465  elements  this 316  clear  find 153  keys  clear  clear  add 827 221  clear  remove 605  this 110  add 520 177  elements  find 675  this 861  remove 971  remove 993  clear  elements  elements  keys  add 188 895  remove 270  add 859 719  keys  elements  this 552  this 756  add 17 878  keys  keys  clear  add 475 797  add 668 694  keys  find 459  clear  add 64 915  count  clear  add 709 409  keys  add 661 458  find 279  add 95 224  clear  elements  remove 115  this 151  remove 781  clear  count  keys  this 575  find 677  remove 169  keys  clear  this 212  find 995  remove 468  add 784 936  clear  remove 517  add 573 470  remove 287  find 482  count  elements  clear  this 16  this 848  keys  remove 806  elements  find 52  count  count  count  add 339 898  add 646 639  remove 377  find 291  keys  keys  add 105 904  count  find 687  count  this 34  clear  find 303  count  this 759  elements  elements  remove 201  add 547 114  count  elements  count  add 835 787  clear  find 418  this 818  elements  this 160  elements  clear  add 365 66  keys  count  count  find 594  clear  elements  elements  count  count  keys  add 815 312  elements  this 941  add 35 851  clear  add 809 151  count  count  count  elements  clear  add 357 294  keys  elements  keys  this 17  keys  keys  clear  elements  elements  find 799  clear  this 3  this 784  clear  elements  clear  add 513 461  this 614  remove 705  add 96 997  remove 311  add 572 254  keys  clear  remove 628  find 205  clear  elements  this 961  add 600 820  count  keys  find 85  add 763 264  remove 529  add 75 727  add 685 434  elements  this 846  this 979  count  find 123  clear  elements  keys  count  clear  clear  keys  this 604  this 884  this 302  keys  find 194  remove 307  elements  remove 463  find 901  add 520 68  add 71 114  remove 620  count  remove 670  this 200  remove 374  this 783  keys  count  count  add 212 58  find 57  count  this 428  this 448  elements  this 359  elements  keys  keys  count  count  this 593  remove 68  count  remove 631  find 995  elements  elements  clear  find 528  add 704 862  keys  count  elements  add 640 461  keys  elements  elements  count  add 283 215  clear  clear  remove 342  add 788 142  elements  keys  this 499  elements  count  keys  count  add 300 355  clear  this 121  elements  count  clear  count  add 131 477  add 454 904  clear  elements  keys  count  count  remove 805  count  remove 561  elements  add 727 437  find 204  this 350  keys  this 63  count  this 94  clear  add 761 939  add 656 665  keys  remove 829  elements  elements  this 371  add 815 494  elements  remove 92  find 889  this 82  find 847  count  find 275  keys  keys  find 265  this 817  remove 526  keys  count  this 896  add 748 897  clear  find 547  remove 274  add 197 160  find 536  keys  this 420  this 696  find 232  clear  clear  clear  elements  this 720  elements  clear  keys  remove 628  count  this 195  find 140  keys  clear  add 299 86  keys  find 565  this 33  this 818  find 902  keys  find 253  count  remove 471  find 909  keys  count  clear  keys  clear  this 568  this 507  remove 684  clear  this 152  this 876  find 685  remove 984  remove 660  elements  find 411  keys  count  count  find 239  keys  this 942  keys  this 617  this 303  remove 505  elements  elements  clear  count  find 607  remove 695  clear  count  remove 674  find 213  clear  find 462  count  remove 673  remove 110  count  remove 504  elements  clear  keys  count  add 153 842  remove 822  elements  remove 134  clear  add 803 587  this 914  keys  elements  find 567  this 270  count  find 300  elements  this 205  elements  clear  remove 883  find 15  count  find 535  find 416  remove 320  find 285  add 858 403  clear  add 553 195  this 286  remove 404  keys  count  add 853 852  elements  this 616  add 792 875  this 857  keys  add 541 379  clear  clear  keys  find 504  elements  count  remove 897  remove 570  this 690  elements  elements  clear  keys  find 995  find 681  remove 506  clear  this 124  count  find 139  clear  keys  elements  add 816 7  this 498  find 358  clear  this 557  elements  clear  find 964  count  elements  elements  find 101  this 98  remove 697  find 57  find 543  count  count  find 156  remove 583  clear  this 874  elements  find 42  clear  keys  count  clear  add 416 958  count  this 714  clear  remove 961  count  find 894  this 119  keys  this 275  clear  elements  add 442 400  clear  elements  clear  remove 535  add 654 135  clear  keys  clear  keys  clear  keys  add 731 804  this 895  elements  find 907  count  this 998  keys  find 584  keys  elements  keys  count  add 724 812  elements  elements  count  find 590  this 825  elements  remove 276  keys  clear  elements  clear  clear  keys  remove 126  clear  find 696  clear  keys  remove 780  elements  add 369 517  add 157 753  keys  add 103 788  count  count  remove 275  remove 965  find 407  find 207  find 17  find 176  clear  remove 554  clear  add 470 76  add 397 714  clear  count  count  remove 118  add 699 911  count  keys  count  keys  keys  remove 833  this 390  count  find 573  this 52  find 340  clear  keys  find 327  elements  this 712  remove 89  clear  this 914  clear  keys  remove 149  clear  remove 554  count  keys  this 511  remove 686  count  add 618 956  keys  add 512 309  add 762 294  keys  remove 10  keys  add 113 737  find 546  elements  find 538  find 980  add 386 497  this 582  keys  remove 902  this 515  clear  add 347 265  clear  find 605  count  add 994 301  find 279  this 422  this 940  remove 750  keys  find 541  count  elements  keys  this 14  this 500  elements  elements  elements  this 495  remove 950  keys  count  this 347  remove 733  count  find 679  elements  add 773 258  elements  elements  add 152 873  remove 11  this 372  clear  elements  find 976  elements  find 13  remove 404  keys  count  count  elements  count  clear  count  count  count  add 274 295  keys  clear  find 370  clear  add 949 792  keys  find 266  remove 393  elements  keys  find 337  keys  remove 161  remove 525  remove 327  keys  add 433 430  this 420  keys  elements  remove 76  this 352  elements  clear  count  find 63  clear  clear  clear  find 166  count  clear  keys  find 115  this 812  add 972 304  find 913  clear  clear  clear  clear  add 437 319  remove 935  remove 288  count  find 730  count  find 97  keys  elements  this 148  clear  clear  elements  clear  clear  remove 170  add 256 103  remove 128  add 22 891  clear  clear  clear  add 288 831  find 168  find 390  add 384 302  this 15  find 324  clear  keys  elements  elements  this 907  clear  find 149  find 679  find 916  remove 191  this 491  clear  clear  find 870  count  remove 388  count  this 221  count  elements  keys  count  find 889  add 618 264  add 964 913  this 987  elements  find 590  clear  elements  remove 88  keys  this 810  add 462 975  count  add 449 576  clear  elements  this 41  find 281  keys  count  remove 868  this 927  this 527  this 914  remove 895  remove 726  keys  count  count  find 663  find 58  remove 779  elements  clear  clear  keys  count  count  elements  elements  elements  keys  keys  keys  add 630 429  count  elements  add 282 473  clear  this 558  keys  this 739  add 515 552  count  elements  find 518  this 410  remove 148  add 170 83  this 962  remove 131  count  elements  this 820  elements  this 763  find 775  keys  find 187  add 736 92  this 375  count  count  clear  keys  this 252  count  find 155  remove 788  keys  find 803  clear  count  count  remove 768  add 247 524  keys  clear  this 446  this 426  find 238  count  add 429 708  find 562  this 335  keys  this 266  clear  keys  count  elements  remove 577  add 645 766  clear  remove 323  this 127  elements  clear  elements  add 188 560  add 997 916  keys  keys  count  count  clear  add 685 91  clear  add 749 647  this 357  this 382  keys  this 780  count  this 45  this 703  clear  remove 989  keys  remove 605  find 236  clear  elements  clear  find 941  add 426 622  add 516 791  remove 975  count  remove 215  remove 664  remove 891  find 541  remove 799  add 720 907  remove 33  elements  keys  elements  elements  clear  add 768 732  count  count  keys  find 157  remove 113  remove 438  this 102  add 773 468  clear  remove 250  elements  add 633 825  find 220  find 99  clear  find 713  keys  remove 462  count  count  count  elements  find 537  this 91  find 172  clear  this 992  keys  remove 259  count  find 684  this 525  elements  find 907  remove 220  clear  find 568  find 400  count  add 264 668  clear  remove 586  count  this 602  elements  elements  count  remove 501 | False  False  False  False  368  False  False  368 876  False  3  3  114 807  368 329  876 371  False  False  False  False  False  False  4  114 368 876 932  114 368 876 932  114 807  368 329  876 371  932 485  114 807  368 329  876 371  932 485  114 368 651 876 932  False  False  114 368 651 876 932  5  114 368 651 876 932  False  114 368 651 876 932  114 368 651 876 932  False  5  False  114 807  368 329  651 900  876 371  932 485  False  False  False  False  False  False  False  False  False  192 465  False  False  False  False  520 177  False  False  False  False  False  188 859  188 895  859 719  False  False  17 188 859  17 188 859  475 668  False  1  709  False  False  False  False  0  False  False  False  False  False  False  False  False  False  1  573 470  False  False  False  False  0  0  0  False  False  339 646  339 646  3  False  3  False  False  0  False  False  1  547 114  1  False  False  False  365  1  1  False  0  0  815 312  False  1  1  1  809 151  357  357 294  357  False  357  357  False  False  False  False  False  False  96 513 572  False  False  False  1  600  False  False  75 727  600 820  685 434  763 264  False  False  4  False  0  False  False  False  False  False  False  False  False  2  False  False  False  False  71 520  2  2  False  3  False  False  71 114  212 58  520 68  False  71 114  212 58  520 68  71 212 520  71 212 520  3  3  False  False  3  False  False  71 114  212 58  520 68  71 114  212 58  520 68  False  704  1  704 862  640 704  640 461  704 862  640 461  704 862  2  False  788 142  788  False  788 142  1  788  1  False  0  0  0  0  False  0  False  False  False  727  False  1  False  656 761  False  656 665  761 939  656 665  761 939  False  656 665  761 939  815 494  False  False  False  False  3  False  656 761 815  656 761 815  False  False  False  656 761 815  3  False  False  False  False  197  False  False  False  False  False  0  False  False  299  False  False  False  False  299  False  1  False  False  299  1  False  False  False  False  False  False  False  False  False  0  0  False  False  False  False  False  0  False  False  0  False  False  False  0  False  False  0  False  0  False  153 842  False  False  803  803 587  False  False  1  False  803 587  False  803 587  False  False  0  False  False  False  False  False  False  553  1  553 195  853 852  False  False  553 792 853  False  0  False  False  False  False  False  False  False  0  False  False  False  False  False  0  False  False  False  False  False  0  0  False  False  False  False  0  1  False  False  0  False  False  False  False  False  731 804  False  1  False  731  False  731  731 804  731  1  724 812  731 804  724 812  731 804  2  False  False  724 812  731 804  False  724 731  False  False  False  157 369  3  3  False  False  False  False  False  False  False  0  0  False  1  699  1  699  699  False  False  1  False  False  False  False  False  False  False  False  False  0  False  False  0  618  512 618 762  False  512 618 762  False  113 737  512 309  618 956  762 294  False  False  False  113 386 512 618 762  False  False  False  0  False  False  False  False  994  False  1  994 301  994  False  False  994 301  994 301  994 301  False  False  994  1  False  False  1  False  994 301  773 258  994 301  773 258  994 301  False  False  False  False  False  0  0  0  0  0  0  274  False  949  False  False  949 792  949  False  949  False  False  False  949  False  433 949  433 430  949 792  False  False  433 430  949 792  0  False  False  0  False  False  False  False  False  1  False  1  False  437  437 319  False  False  False  False  False  False  False  False  False  False  False  False  False  False  0  False  0  False  0  0  False  False  618 264  964 913  False  False  False  1  False  False  0  False  False  False  False  False  False  0  0  False  False  False  0  0  1  630 429  False  False  1  515 552  False  False  False  False  False  2  170 83  515 552  False  170 83  515 552  False  False  170 515  False  False  3  3  False  0  False  False  False  0  0  False  247  False  False  False  0  False  False  429  False  0  False  False  False  188 997  188 997  2  2  False  False  749  False  1  False  False  False  False  False  False  False  2  False  False  False  False  False  False  426 622  516 791  720 907  426 516 720  426 622  516 791  720 907  426 622  516 791  720 907  1  1  768  False  False  False  False  False  False  False  False  False  0  0  0  False  False  False  False  False  0  False  False  False  False  False  False  0  False  0  False  0  False |
| **Вход** | **Изход** |
| 815  add 16 39  add 44 71  add 15 72  add 74 99  add 70 12  add 96 58  add 34 48  add 37 47  add 33 83  add 16 97  add 76 19  add 31 24  add 72 41  add 71 65  add 23 20  add 93 11  add 74 56  add 36 56  add 94 79  add 43 21  add 27 98  add 43 98  add 47 49  add 77 34  add 90 63  add 26 23  add 16 40  add 94 42  add 54 49  add 59 36  add 63 38  add 70 53  add 40 79  add 43 55  add 25 96  add 63 45  add 24 78  add 64 37  add 14 32  add 33 89  add 36 88  add 52 24  add 97 30  add 24 86  add 24 72  add 29 79  add 29 91  add 70 44  add 79 98  add 48 65  add 11 17  add 63 16  add 50 72  add 36 66  add 82 99  add 31 49  add 96 85  add 29 13  add 54 66  add 64 72  add 94 58  add 88 23  add 53 61  add 28 79  add 64 93  add 89 87  add 65 58  add 46 52  add 78 81  add 92 19  add 21 85  add 66 41  add 60 93  add 23 77  add 97 77  add 46 65  add 73 65  add 19 98  add 67 58  add 84 20  add 75 61  add 26 16  add 15 98  add 27 39  add 59 52  add 70 48  add 74 41  add 94 29  add 71 12  add 86 99  add 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False  False  False  False  90 |
| Задача 9. Реализация на HashedSet | |
| **Условие**  Реализирайте структурата от данни "Set" в клас HashedSet<T>. Използвайте класа от предната задача HashTable<K, T>, за да пазите елементите. Имплементирайте всички стандартни операции за типа данни Set: Add(T), Find(T), Remove(T), Count, Clear(),обединение и сечение.  Напишете програма, която чете от конзолата команди, указващи действия, които да се извършат върху множество от цели числа. Програмата да започва с прочитане на броя команди и на самите команди. Командите са в следните формати:  add m –добавя числото m в множеството. Ако m вече се съдържа в множеството, на екрана се изписва "False" на нов ред.  count – изписва на екрана съобщение "c", където c е броят елементи в множеството.  remove m – ако множеството съдържаm, то m се изтрива от него. В противен случай на екрана се изписва съобщение "False".  find m – ако множеството съдържа m, на екрана се изписва съобщение "True". В противен случай на екрана се изписва съобщение "False".  clear – изтрива всички елементи от множеството.  union a b c… - в множеството се запазва обединението му с множеството, състоящо се от a, b, c…  intersect a b c… - в множеството се запазва сечението му с множеството, състоящо се от a, b, c…  elements – извежда всички елементи на множеството, сортирани в нарастващ ред, разделени с интервал.  Пример:  14  add 14  add 15  count  elements  remove 3  add 14  remove 14  union 1 2 3  remove 12  find 15  intersect 2 15 17  elements  clear  count  Резултат:  2  14 15  False  False  False  True  2 15  0 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  Един вариант да решите задачата е, да използвате за ключ в хеш-таблицата елемента от множеството, а за стойност винаги **true**. Обединението и сечението ще извършвате с обхождане по елементите на едното множество и проверка дали в едното множество се съдържа (съответно не се съдържа) елементът от другото множество. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  using System.Text;  class HashedSet<T> : IEnumerable<T>  {  private const bool DefaultValue = true;  HashTable<T, bool> container;  public int Count  {  get  {  return container.Count;  }  }  public HashedSet()  {  this.container = new HashTable<T, bool>();  }  public bool Add(T element)  {  bool containsElement = this.Find(element);  if (containsElement)  {  return false;  }  else  {  container.Add(element, DefaultValue);  return true;  }  }  public bool Find(T element)  {  /\* If the element is found,  \* the variable containerContainsElement will be initialized with DefaultValue.  \* Otherwise, it will be initialized with the default value of bool, i.e. false.  \*/  bool containerContainsElement = container.Find(element);  return containerContainsElement;  }  public bool Remove(T element)  {  bool isElementRemoved = container.Remove(element);  return isElementRemoved;  }  public void Clear()  {  this.container.Clear();  }  public void Union(HashedSet<T> otherSet)  {  if (otherSet == null)  {  throw new ArgumentNullException();  }  foreach (var item in otherSet)  {  this.Add(item);  }  }  public void Intersect(HashedSet<T> otherSet)  {  if (otherSet == null)  {  throw new ArgumentNullException();  }  HashedSet<T> intersection = new HashedSet<T>();  foreach (var item in otherSet)  {  if (this.Find(item))  {  intersection.Add(item);  }  }  this.container = intersection.container;  }  public IEnumerator<T> GetEnumerator()  {  foreach (var item in this.container)  {  yield return item.Key;  }  }  IEnumerator IEnumerable.GetEnumerator()  {  return this.GetEnumerator();  }  }  class CommandExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  HashedSet<int> set = new HashedSet<int>();  ExecuteCommands(set);  Console.WriteLine(output.ToString().Trim());  }  private static void ExecuteCommands(HashedSet<int> set)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, set);  }  }  private static void ExecuteCommands(string command, HashedSet<int> set)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, set);  break;  case "count":  ExecuteCountCommand(set);  break;  case "remove":  ExecuteRemoveCommand(tokens, set);  break;  case "find":  ExecuteFindCommand(tokens, set);  break;  case "clear":  ExecuteClearCommand(set);  break;  case "union":  ExecuteUnionCommand(tokens, set);  break;  case "intersect":  ExecuteIntersectCommand(tokens, set);  break;  case "elements":  ExecuteElementsCommand(set);  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteAddCommand(string[] tokens, HashedSet<int> set)  {  int newElement = int.Parse(tokens[1]);  bool isCommandSuccessful = set.Add(newElement);  if (!isCommandSuccessful)  {  PrintLine(isCommandSuccessful.ToString());  }  }  private static void ExecuteCountCommand(HashedSet<int> set)  {  int count = set.Count;  PrintLine(count.ToString());  }  private static void ExecuteRemoveCommand(string[] tokens, HashedSet<int> set)  {  int element = int.Parse(tokens[1]);  bool isRemoved = set.Remove(element);  if (!isRemoved)  {  PrintLine(isRemoved.ToString());  }  }  private static void ExecuteFindCommand(string[] tokens, HashedSet<int> set)  {  int element = int.Parse(tokens[1]);  bool contains = set.Find(element);  PrintLine(contains.ToString());  }  private static void ExecuteClearCommand(HashedSet<int> set)  {  set.Clear();  }  private static void ExecuteUnionCommand(string[] tokens, HashedSet<int> set)  {  HashedSet<int> unionSet = new HashedSet<int>();  for (int i = 1; i < tokens.Length; i++)  {  int otherSetElement = int.Parse(tokens[i]);  unionSet.Add(otherSetElement);  }  set.Union(unionSet);  }  private static void ExecuteIntersectCommand(string[] tokens, HashedSet<int> set)  {  HashedSet<int> intersectionSet = new HashedSet<int>();  for (int i = 1; i < tokens.Length; i++)  {  int otherSetElement = int.Parse(tokens[i]);  intersectionSet.Add(otherSetElement);  }  set.Intersect(intersectionSet);  }  private static void ExecuteElementsCommand(HashedSet<int> set)  {  SortedSet<int> sortedSet = new SortedSet<int>();  foreach (var item in set)  {  sortedSet.Add(item);  }  StringBuilder buffer = new StringBuilder();  foreach (var item in sortedSet)  {  buffer.AppendFormat("{0} ", item);  }  PrintLine(buffer.ToString());  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 14  add 14  add 15  count  elements  remove 3  add 14  remove 14  union 1 2 3  remove 12  find 15  intersect 2 15 17  elements  clear  count | 2  14 15  False  False  False  True  2 15  0 |
| **Вход** | **Изход** |
| 147  remove 517  add 550  clear  find 338  remove 481  add 388  find 721  clear  count  union 0 6 10 16  count  find 843  count  remove 608  add 318  intersect 5  union 8 11 19 19 16 8 1 10 13  add 760  count  add 777  remove 221  elements  elements  remove 544  count  clear  count  remove 483  clear  find 840  union 11 16 9 11 13 4 19  intersect 7 18 4 9 0  clear  remove 325  elements  elements  elements  count  intersect 8 3 19 2 6 16 8  union 3 0 0  remove 324  count  remove 943  remove 946  intersect 7 18 4 9 0  intersect 15 3  union 11 10  count  remove 637  union 14 12 6 7 3 0 19 6  clear  add 545  remove 397  clear  intersect 0 4 3  remove 313  add 688  clear  clear  find 8  intersect 7 9 12 12 14 0 12 12  remove 251  clear  clear  union 0 4 3  find 603  union 11 10  union 17 1 1 4 4 12  clear  remove 513  clear  find 695  elements  add 926  union 2 0 3 16 2  find 44  union 8 11 19 19 16 8 1 10 13  union 11 16 9 11 13 4 19  remove 247  union 15 10 16 11 5  find 369  find 720  add 326  add 940  intersect 17 1 1 4 4 12  add 768  find 746  union 16 13 3 17 8 10  elements  add 751  add 804  add 623  union 11 19 16 18 16 11 9 14  find 47  union 4 15 2 3 7 12 1 0  remove 403  find 50  find 165  elements  add 856  find 368  intersect 11 19 16 18 16 11 9 14  count  intersect 18 6 16 17 10 8 10 18  union 2 0 3 16 2  elements  add 503  remove 293  find 578  clear  find 745  intersect 17 4 8 11 7 0 1  clear  remove 416  count  find 420  union 13 7 14 5 12 14 1 15  elements  clear  intersect 6 3 2 12 0 5 9 9 13  add 615  find 195  union 12 5 6 18 9 6 11  intersect 16 13 3 17 8 10  remove 883  count  clear  count  add 109  elements  find 933  intersect 7 0 12 15 3 8  count  count  intersect 3 7 5 16 11 9 9 19 4  find 858  union 11 14 1 5 10 16  intersect 16 15 11 4 11 18 8  clear  remove 323  find 203  union 0 9 18 3 3  find 807  clear  elements  union 4 2 7 13  union 0 9 18 3 3 | False  False  False  False  0  4  False  4  False  8  False  1 8 10 11 13 16 19 760 777  1 8 10 11 13 16 19 760 777  False  9  0  False  False  False  0  False  2  False  False  2  False  False  False  False  False  False  False  False  False  False  False  False  False  1 3 4 8 10 13 16 17 768  False  False  False  False  0 1 2 3 4 7 8 9 10 11 12 13 14 15 16 17 18 19 623 751 768 804  False  6  0 2 3 16 18  False  False  False  False  0  False  1 5 7 12 13 14 15  False  False  0  0  109  False  0  0  False  False  False  False |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 438  clear  count  elements  count  remove 87  find 125  add 673  add 713  intersect 13 17 3  elements  elements  intersect 16 1 3 14 19 2 11 7  elements  add 207  clear  remove 377  find 648  union 4 5 15 19 13 12  clear  remove 845  union 17 4 8 11 7 0 1  find 287  union 17 19 13 18 1  intersect 15 5 1  clear  add 80  find 301  count  remove 638  add 872  add 350  find 88  clear  count  add 869  clear  union 8  find 258  clear  union 17 1 1 4 4 12  remove 58  remove 743  count  elements  add 242  remove 8  count  count  add 139  count  add 622  remove 434  add 393  clear  add 340  remove 880  find 63  add 190  intersect 9 14 4 15 5 6 10 3  union 12 12 11  elements  count  remove 307  union 10  count  count  union 16  add 862  intersect 13  find 594  intersect 5 11 5 0  count  union 8 16  union 17 19 13 18 1  elements  find 349  find 44  count  count  count  union 3 0 0  clear  count  add 667  remove 641  remove 774  count  elements  find 328  find 65  add 610  find 397  intersect 1  elements  add 231  count  find 827  remove 711  count  add 583  remove 386  remove 233  count  find 927  find 332  elements  elements  count  intersect 1 2 13 13 0 4 10 8 8  union 17 13 1 7  remove 349  find 685  intersect 8 16  remove 524  clear  elements  intersect 0 6 10 16  find 349  clear  clear  count  remove 123  elements  add 832  elements  count  clear  elements  find 478  add 787  find 682  intersect 10 9 7 12  add 362  intersect 1  intersect 16 1 3 14 19 2 11 7  add 846  union 16 13 3 17 8 10  clear  union 11 5 9 9 4 16 12 2 8  elements  remove 349  add 510  find 685  add 451  find 240  count  intersect 19 17 0 10 9 18 12 17  intersect 18 6 16 17 10 8 10 18  intersect 4 18 10 9 9 19 10 18 18  count  clear  union 15 10 16 11 5  count  intersect 14 5 4 8 14  find 202  intersect 1 6  count  intersect 14 8 11 14 17 4  elements  elements  find 154  union 15 5 1  elements  remove 74  union 19 4 5 0 12  elements  clear  count  elements  elements  remove 362  elements  clear  find 125  remove 642  count  clear  remove 35  count  intersect 1 17 18 0 14 8  remove 625  union 5 2  elements  find 635  intersect 17 13 1 7  union 1 17 18 0 14 8  find 38  intersect 5 2  remove 562  find 244  find 820  count  count  count  intersect 9 12 17 9 2 18 1  intersect 8 3 19 2 6 16 8  count  remove 877  add 213  intersect 17 10 13  remove 894  elements  add 479  union 4 18 10 9 9 19 10 18 18  intersect 19 17 0 10 9 18 12 17  clear  union 19 8 0 13 18 6 19  intersect 4 13 15 16 4 4 11  count  intersect 13 10 1 11 14 2 10 13 3  elements  remove 44  add 464  find 444  count  union 14 8 11 14 17 4  union 13 7 14 5 12 14 1 15  intersect 8 11 19 19 16 8 1 10 13  count  count  clear  elements  find 564  find 764  intersect 3 4 17 9 8 2 19 1  remove 196  clear  add 466  elements  add 912  clear  remove 137  intersect 19 19 8 17 11 6 1 15 8  count  intersect 0 4 3  clear  intersect 9 9 9 2 19 10  add 931  count  count  intersect 14 10 18 1 0 12 10  add 320  add 845  count  count  count  clear  intersect 10 9 7 12  remove 824  remove 763  union 3 0 0  union 0 9 18 3 3  find 639  find 412  find 20  elements  add 567  elements  union 18 8 3 4 12 15 19 16 14  count  add 835  union 0 4 3  union 15 15 13 14 5 7 9 4 19  add 407  count  elements  remove 997  find 604  union 19 8 0 13 18 6 19  add 191  clear  count  add 751  count  add 598  elements  elements  elements  count  clear  remove 829  find 531  remove 988  union 12 14 19 15  elements  find 658  union 11 16 9 11 13 4 19  union 3 7 5 16 11 9 9 19 4  find 981  find 320  intersect 18 6 16 17 10 8 10 18  union 18  add 187  remove 690  clear  intersect 4 15 2 3 7 12 1 0  add 167  count  union 15 5 1  find 522  intersect 15 10 16 11 5  union 7 16 17 2  intersect 13 14  count  clear  remove 511  find 971  count  elements  clear  clear  find 78  clear  union 7 18 4 9 0  remove 9  remove 80  find 255  remove 491  find 602  add 625  elements  add 73  union 8 18 2  union 1 2 13 13 0 4 10 8 8  elements  clear  intersect 10 9 7 12  count  union 9 12 17 9 2 18 1  intersect 13 10 1 11 14 2 10 13 3  clear  intersect 19 4 5 0 12  count  intersect 10  clear  remove 339  find 324  elements  elements  add 836  elements  find 346  remove 843  clear  elements  add 369  add 730  intersect 12 12 11  remove 65  find 776  find 732  elements  union 19 11 8 0 1 13 8 9  intersect 9 9 9 2 19 10  union 10 12 14 18 7  union 15 10 16 11 5  intersect 19 6 13 7 15 18  clear  add 507  add 831  intersect 0 6 10 16  find 937  add 691  union 1 6  count  add 362  add 65  remove 998  clear  find 186  count  count  intersect 8  clear  clear  remove 760  clear  remove 985  find 696  remove 442  find 287  count  find 536  union 19 8 0 13 18 6 19  elements  intersect 7 13 9  intersect 7 18 4 9 0  clear  union 11 19 16 18 16 11 9 14  intersect 3  add 847  remove 834  elements  count  intersect 17 1 1 4 4 12  union 14 12 6 7 3 0 19 6  count  find 203  union 1  add 611  union 11 5 9 9 4 16 12 2 8  intersect 4 5 15 19 13 12  elements  find 941  remove 11  elements  union 7 0 12 15 3 8  union 3 7 5 16 11 9 9 19 4  find 484  count  remove 848  elements  clear  find 112  find 572  intersect 16 8  add 483  union 17 19 13 18 1  find 296  elements  add 83  elements  union 10  remove 412  clear  elements  remove 78  union 2 15 8  count  union 7 9 12 12 14 0 12 12  add 379  clear  count  add 160  intersect 8 16  clear  add 81  intersect 5 13 12 6 9 | 0  0  False  False  False  False  False  False  False  1  False  False  0  False  False  False  4  1 4 12 17  False  5  5  6  False  False  False  11 12  2  False  3  3  False  0  1 8 13 16 17 18 19  False  False  7  7  7  0  False  False  1  667  False  False  False  1  False  False  1  False  False  2  False  False  231 583  231 583  2  False  False  False  False  0  False  832  1  False  False  2 4 5 8 9 11 12 16  False  False  False  10  0  5  False  0  False  1 5 15  False  0 1 4 5 12 15 19  0  False  False  False  0  False  0  False  2 5  False  False  False  False  False  0  0  0  0  False  False  1  13  False  False  2  4  4  False  False  False  466  False  0  1  1  2  2  2  False  False  False  False  False  0 3 9 18  0 3 9 18 567  12  17  0 3 4 5 7 8 9 12 13 14 15 16 18 19 407 567 835  False  False  0  1  598 751  598 751  598 751  2  False  False  False  12 14 15 19  False  False  False  False  1  False  0  False  False  0  False  False  False  False  False  0 4 7 18 625  0 1 2 4 7 8 10 13 18 73 625  0  0  False  False  836  False  False  False  False  False  False  3  False  False  0  0  False  False  False  False  False  0  False  0 6 8 13 18 19  False  847  1  7  False  4 5 12 19  False  False  4 5 12 19  False  12  False  0 3 4 5 7 8 9 11 12 15 16 19  False  False  False  1 13 17 18 19 483  1 13 17 18 19 83 483  False  False  3  0 |
| **Вход** | **Изход** |
| 666  elements  clear  remove 803  add 948  add 411  add 983  intersect 4 18 10 9 9 19 10 18 18  find 731  count  add 894  elements  count  add 400  clear  elements  add 660  remove 512  count  find 119  intersect 18 1 18 14  clear  clear  clear  remove 906  find 705  find 247  add 610  union 12 5 6 18 9 6 11  remove 64  find 593  count  find 934  intersect 1 2 13 13 0 4 10 8 8  clear  remove 576  remove 143  union 8 16  intersect 16 1 3 14 19 2 11 7  elements  count  add 41  elements  add 892  add 486  count  intersect 11  remove 6  remove 148  remove 294  add 634  remove 726  intersect 1 17 18 0 14 8  elements  add 321  intersect 0 2  remove 16  add 429  count  union 6 18 7 19 15 10 10  intersect 0 6 10 16  count  remove 701  count  elements  union 5 5 12 9  union 1 6  remove 277  count  intersect 5  remove 184  union 16 13 3 17 8 10  remove 237  add 775  intersect 0 9 18 3 3  find 220  count  intersect 19 6 13 7 15 18  count  remove 833  remove 45  add 759  elements  add 819  count  intersect 0 6 10 16  elements  add 500  find 454  clear  union 17 10 13  find 543  add 542  count  find 515  clear  union 15 5 1  find 256  remove 0  elements  find 767  intersect 0 6 10 16  clear  remove 558  remove 214  find 753  intersect 16 3 11 1 2 10 1 5 18  clear  elements  intersect 2 0 3 16 2  count  count  union 16 3 11 1 2 10 1 5 18  union 17 1 1 4 4 12  intersect 1 19 5 7 17 16 1  count  remove 448  count  union 19 4 5 0 12  elements  elements  add 57  union 15 5 1  remove 41  elements  elements  count  elements  add 491  clear  intersect 5 11 5 0  union 16 1 3 14 19 2 11 7  elements  add 192  remove 238  union 7 9 12 12 14 0 12 12  elements  clear  remove 904  add 218  clear  intersect 19 19 8 17 11 6 1 15 8  elements  union 19 4 5 0 12  remove 76  remove 113  count  intersect 19 4 5 0 12  intersect 7 13 9  remove 144  find 373  intersect 19 8 0 13 18 6 19  intersect 0 4 3  intersect 0 2  intersect 15 10 16 11 5  intersect 18 1 18 14  union 15 5 1  add 803  elements  remove 254  union 8  add 416  find 844  union 11 5 9 9 4 16 12 2 8  add 483  union 12 5 6 18 9 6 11  count  union 14 10 18 1 0 12 10  intersect 7 16 17 2  remove 7  intersect 11 14 1 5 10 16  add 316  elements  count  find 350  clear  find 54  elements  clear  find 452  clear  clear  find 957  remove 367  count  find 716  count  count  find 545  add 301  intersect 19 4 5 0 12  find 965  clear  intersect 3 18  remove 153  count  elements  find 112  clear  elements  find 93  find 781  add 906  find 574  elements  union 14 8 11 14 17 4  elements  remove 170  intersect 16 3 11 1 2 10 1 5 18  elements  remove 211  clear  find 536  clear  elements  clear  elements  remove 286  intersect 2 2 10 3 5 14 10  intersect 19 11 8 0 1 13 8 9  elements  union 3 18  add 73  intersect 8 3 19 2 6 16 8  find 384  elements  find 325  elements  elements  remove 118  find 447  elements  count  elements  elements  find 947  find 467  count  add 655  count  intersect 19 4 5 0 12  intersect 10 12 14 18 7  add 589  clear  union 15 5 1  count  remove 816  count  clear  add 294  elements  union 16  count  elements  remove 443  union 18  elements  count  union 4 18 10 9 9 19 10 18 18  clear  clear  elements  union 17 10 13  count  elements  clear  find 883  intersect 8  union 2 17 15 10  intersect 19 17 0 10 9 18 12 17  add 709  elements  elements  count  clear  find 518  clear  remove 510  add 108  find 56  remove 795  count  add 590  remove 77  elements  remove 142  union 16  intersect 11  clear  count  clear  union 1 19 5 7 17 16 1  add 260  count  intersect 19 6 13 7 15 18  add 105  find 215  elements  union 5 13 12 6 9  find 949  intersect 11 14 1 5 10 16  intersect 1 2 13 13 0 4 10 8 8  union 19 8 0 13 18 6 19  union 16 15 11 4 11 18 8  union 6 16 0 12 12 2  union 14 10 18 1 0 12 10  elements  union 7 13 9  add 31  elements  find 412  find 796  count  elements  intersect 5 11 5 0  find 919  intersect 17 19 13 18 1  union 10 16 12 2 7 13 19 1 8  remove 632  elements  find 709  union 9 9 9 2 19 10  find 60  add 541  clear  add 943  count  find 701  count  elements  union 4 2 7 13  add 574  add 274  intersect 16 3 11 1 2 10 1 5 18  union 18 1 18 14  union 18  union 7 9 12 12 14 0 12 12  find 158  remove 685  remove 292  remove 124  add 351  remove 254  clear  elements  intersect 14 5 4 8 14  add 218  union 19 11 8 0 1 13 8 9  add 12  count  add 954  count  intersect 7 9 12 12 14 0 12 12  add 693  remove 905  intersect 17 4 8 11 7 0 1  union 14 5 4 8 14  elements  intersect 11 14 1 5 10 16  elements  clear  clear  remove 685  count  intersect 10 9 7 12  elements  elements  elements  union 3 0 0  find 678  elements  find 911  count  union 10  find 393  add 360  add 419  find 875  count  add 892  remove 813  union 16 8  find 739  clear  intersect 16 13 3 17 8 10  find 907  add 186  add 848  find 144  union 0 6 10 16  intersect 3 18  add 244  find 230  clear  elements  union 17 1 1 4 4 12  remove 868  union 18 19  add 380  union 2 17 15 10  remove 483  union 15 10 16 11 5  find 551  intersect 1 2 13 13 0 4 10 8 8  find 814  remove 158  add 287  count  elements  count  count  remove 569  count  count  elements  intersect 12 5 6 18 9 6 11  elements  intersect 1 2 13 13 0 4 10 8 8  count  add 142  union 10  union 12 5 6 18 9 6 11  count  union 1 2 13 13 0 4 10 8 8  count  find 474  elements  intersect 10 9 7 12  clear  clear  intersect 5 5 12 9  union 11  union 11  add 113  clear  add 591  intersect 6 18 7 19 15 10 10  find 716  count  remove 270  union 13 7 14 5 12 14 1 15  elements  remove 406  elements  remove 642  elements  intersect 9 1 9 5  remove 338  count  remove 362  count  intersect 5 13 12 6 9  remove 386  remove 531  add 101  intersect 11 10  intersect 5 5 12 9  intersect 16 3 11 1 2 10 1 5 18  count  clear  clear  add 850  clear  find 651  intersect 9 14 4 15 5 6 10 3  add 832  remove 18  remove 740  find 567  add 280  elements  find 5  elements  remove 183  elements  remove 604  remove 506  clear  count  add 867  union 2 17 15 10  add 410  intersect 13 7 14 5 12 14 1 15  count  add 842  remove 494  count  add 824  add 203  count  elements  clear  intersect 14 5 4 8 14  clear  union 18 1 18 14  union 16  count  add 519  add 498  union 11 16 9 11 13 4 19  count  union 5 11 5 0  remove 156  remove 567  intersect 2 2 10 3 5 14 10  count  clear  intersect 7 9 12 12 14 0 12 12  elements  find 542  add 274  union 17 4 8 11 7 0 1  count  add 30  add 352  union 3 4 17 9 8 2 19 1  clear  add 494  intersect 5 13 12 6 9  intersect 2 9 15  elements  count  add 840  add 682  elements  elements  remove 448  add 874  union 9 12 17 9 2 18 1  union 9 14 4 15 5 6 10 3  find 727  intersect 17 19 13 18 1  elements  add 605  elements  add 413  add 32  union 16 1 3 14 19 2 11 7  remove 781  add 931  add 257  find 231  count  elements  union 3 4 17 9 8 2 19 1  union 16  elements  find 17  clear  intersect 10 12 14 18 7  add 112  elements  intersect 8 3 19 2 6 16 8  intersect 16  count  intersect 3 18  union 16 1 3 14 19 2 11 7  remove 438  count  remove 865  intersect 11 10  find 46  count  clear  elements  remove 732  remove 22  elements  clear  find 436  count  count  elements  count  intersect 10  elements  count  union 14 12 6 7 3 0 19 6  find 538  remove 782  elements  remove 457  union 14 8 11 14 17 4  count  elements  remove 526  intersect 16  add 558  remove 445  clear  count  remove 266  count  union 9 1 9 5  clear  elements  find 704  elements  find 800  intersect 11  elements  clear  clear  union 3 7 5 16 11 9 9 19 4  clear  remove 918  count  clear  elements  union 5 5 12 9  union 5 13 12 6 9  clear  clear  intersect 0 9 18 3 3  add 103  remove 56  add 889  union 13 10 1 11 14 2 10 13 3  count  elements  remove 503  clear  intersect 2 9 15  clear  find 50  clear  remove 994  elements  find 94  union 19 19 8 17 11 6 1 15 8  find 501  remove 675  add 281  union 15 5 1  union 13 7 14 5 12 14 1 15  union 4 18 10 9 9 19 10 18 18  find 853  remove 22  count  add 837  add 373  elements  add 29  find 551  add 416  add 102  union 16 13 3 17 8 10  remove 298  find 215  remove 478  intersect 5 5 12 9  intersect 9 9 9 2 19 10  add 298  elements  intersect 6 16 0 12 12 2  union 11 5 9 9 4 16 12 2 8  elements  intersect 7 18 4 9 0  remove 723  find 587  find 260  remove 550  count  count  clear  union 11 5 9 9 4 16 12 2 8  clear | False  False  0  894  1  False  1  False  False  False  False  False  False  7  False  False  False  16  1  16 41  4  False  False  False  False  False  1  2  False  2  6 10  False  6  False  False  False  1  0  False  False  759  2  False  False  4  False  False  False  1 5 15  False  False  False  False  0  0  4  False  4  0 1 4 5 12 16 17 19  0 1 4 5 12 16 17 19  False  0 1 4 5 12 15 16 17 19 57  0 1 4 5 12 15 16 17 19 57  10  0 1 4 5 12 15 16 17 19 57  1 2 3 7 11 14 16 19  False  0 1 2 3 7 9 11 12 14 16 19 192  False  False  False  5  False  False  1 5 15 803  False  False  15  False  16 316  2  False  False  False  False  False  0  False  0  0  False  False  False  0  False  False  False  False  906  4 8 11 14 17 906  False  11  False  False  False  False  3  False  3  3  False  False  3  1  3  3  False  False  1  2  3  False  3  294  2  16 294  False  16 18 294  3  3  10 13 17  False  10 17 709  10 17 709  3  False  False  False  False  1  False  108 590  False  0  7  False  7 19 105  False  0 1 2 4 6 8 10 11 12 13 14 15 16 18 19  0 1 2 4 6 7 8 9 10 11 12 13 14 15 16 18 19 31  False  False  18  0 1 2 4 6 7 8 9 10 11 12 13 14 15 16 18 19 31  False  False  1 2 7 8 10 12 13 16 19  False  False  1  False  1  943  False  False  False  False  False  9  10  False  0 4 5 8 14  5 14  False  0  False  0 3  False  2  False  False  5  False  False  False  False  False  False  False  False  False  False  5  1 2 4 10 287  5  5  False  5  5  1 2 4 10 287  0  8  14  False  0 1 2 4 5 6 8 9 10 11 12 13 18 142  False  0  False  1 5 7 12 13 14 15  False  1 5 7 12 13 14 15  False  1 5 7 12 13 14 15  False  2  False  2  False  False  0  False  False  False  False  280 832  False  280 832  False  280 832  False  False  0  1  False  2  4  15 203 824 842  4  11  False  False  2  False  8  0  682 840  682 840  False  False  1 17 18  1 17 18 605  False  False  15  1 2 3 7 11 14 16 17 18 19 32 257 413 605 931  1 2 3 4 7 8 9 11 14 16 17 18 19 32 257 413 605 931  True  112  0  False  8  False  False  1  False  False  False  0  0  0  0  False  False  0 3 6 7 12 14 19  False  11  0 3 4 6 7 8 11 12 14 17 19  False  False  0  False  0  False  False  False  0  False  9  1 2 3 10 11 13 14 103 889  False  False  False  False  False  False  False  False  17  1 4 5 6 7 8 9 10 11 12 13 14 15 17 18 19 281 373 837  False  False  False  False  9 298  2 4 5 8 9 11 12 16  False  False  False  False  2  2 |
| **Вход** | **Изход** |
| 587  union 17 10 13  clear  intersect 15 8 8 4  union 16 15 11 4 11 18 8  count  count  count  add 301  intersect 14 8 11 14 17 4  add 422  find 42  remove 182  elements  count  add 503  add 214  add 988  find 567  intersect 12 5 6 18 9 6 11  find 704  union 9 12 17 9 2 18 1  count  remove 352  elements  find 1  clear  clear  clear  union 17 13 1 7  elements  elements  find 69  find 270  clear  intersect 18 6 16 17 10 8 10 18  count  elements  intersect 12 14 19 15  union 2 9 15  union 3 18  find 143  elements  add 960  find 228  count  union 8 16  intersect 19 17 0 10 9 18 12 17  clear  find 904  remove 141  add 111  elements  find 427  clear  elements  elements  count  find 195  find 50  count  remove 274  elements  count  find 743  elements  elements  find 231  elements  union 3  union 14 5 4 8 14  elements  intersect 9 1 9 5  find 160  clear  elements  intersect 10  elements  clear  add 155  intersect 4 13 15 16 4 4 11  add 630  union 19 8 0 13 18 6 19  find 689  union 17 10 13  find 620  count  add 617  union 19 4 5 0 12  union 8 11 19 19 16 8 1 10 13  count  count  remove 705  add 10  elements  clear  find 510  intersect 7 0 12 15 3 8  elements  union 5 13 12 6 9  count  clear  count  remove 68  clear  remove 98  count  clear  union 1 17 18 0 14 8  elements  clear  remove 32  clear  remove 760  intersect 17 19 13 18 1  clear  count  elements  clear  union 2 0 3 16 2  elements  count  elements  add 524  elements  remove 904  add 532  count  union 18  elements  add 31  count  find 143  elements  add 166  find 165  elements  count  elements  intersect 3 18  find 266  union 18 8 3 4 12 15 19 16 14  add 257  elements  remove 482  add 985  clear  clear  remove 500  remove 622  clear  intersect 16 1 3 14 19 2 11 7  find 24  find 476  intersect 12 12 11  intersect 7 13 9  union 6 3 2 12 0 5 9 9 13  remove 948  clear  count  union 8 18 2  clear  remove 118  union 18  union 1 19 5 7 17 16 1  remove 158  remove 520  elements  elements  intersect 12 14 19 15  clear  add 889  count  remove 788  count  find 557  find 219  union 7 18 4 9 0  intersect 13 17 3  add 356  clear  count  intersect 6 0 14 5 18 17 19 11  find 171  intersect 11  remove 145  remove 554  elements  elements  union 10 7 19  intersect 5 13 12 6 9  elements  union 17 13 1 7  remove 476  remove 857  clear  remove 925  add 332  clear  add 225  count  remove 742  elements  add 59  elements  add 348  add 642  elements  elements  clear  clear  find 721  clear  elements  count  find 280  remove 758  find 433  elements  elements  intersect 14 5 4 8 14  elements  clear  count  remove 788  clear  elements  elements  intersect 16 3 11 1 2 10 1 5 18  elements  clear  union 8 18 2  intersect 8 16  elements  elements  union 8 16  remove 789  clear  elements  intersect 12 5 6 18 9 6 11  elements  elements  clear  clear  count  elements  remove 566  add 67  union 2 0 3 16 2  intersect 4 13 15 16 4 4 11  clear  intersect 4 15 2 3 7 12 1 0  count  count  intersect 19 4 5 0 12  add 923  add 495  elements  count  find 466  count  elements  count  clear  elements  clear  elements  find 231  clear  elements  remove 161  count  intersect 4 15 2 3 7 12 1 0  remove 138  intersect 10 7 19  clear  add 417  intersect 5 11 5 0  remove 941  add 481  add 150  intersect 17 1 1 4 4 12  add 822  add 463  add 912  remove 518  find 502  clear  count  clear  find 816  count  remove 149  intersect 4 2 7 13  clear  elements  count  clear  find 531  clear  union 2 15 8  elements  count  find 164  find 61  find 654  remove 261  count  clear  find 132  clear  intersect 10 12 14 18 7  find 938  count  elements  count  elements  remove 497  remove 152  union 10 12 14 18 7  add 553  remove 606  clear  find 352  add 32  add 329  find 503  add 887  clear  intersect 0 9 18 3 3  intersect 8  union 12 5 6 18 9 6 11  add 634  clear  add 741  count  count  union 10  elements  union 3 7 5 16 11 9 9 19 4  remove 707  elements  elements  intersect 9 12 17 9 2 18 1  count  union 13 10 1 11 14 2 10 13 3  remove 608  union 5  count  add 701  union 7 0 12 15 3 8  remove 66  elements  add 455  union 5 5 12 9  clear  union 12 17 6 1 18  elements  remove 894  find 664  find 744  count  union 11  remove 141  find 963  remove 728  add 832  union 10 12 14 18 7  count  find 937  elements  clear  union 13 14  count  remove 183  elements  remove 954  add 788  count  find 187  add 977  find 864  elements  elements  elements  count  union 10 7 19  intersect 18 1 18 14  union 5 2  elements  count  elements  find 427  elements  intersect 11 5 9 9 4 16 12 2 8  count  clear  elements  clear  elements  add 187  remove 174  count  remove 838  intersect 17 4 8 11 7 0 1  count  remove 480  add 71  remove 11  remove 361  clear  clear  union 15 10 16 11 5  intersect 15 15 13 14 5 7 9 4 19  remove 755  clear  remove 65  intersect 17 1 1 4 4 12  elements  find 993  intersect 16 15 11 4 11 18 8  remove 738  union 12 12 11  intersect 14 10 18 1 0 12 10  remove 994  union 16 15 11 4 11 18 8  find 853  find 978  elements  count  find 35  count  union 13  count  intersect 5  union 9 14 4 15 5 6 10 3  union 18 19  remove 370  add 30  count  remove 688  clear  union 5 5 12 9  union 5 2  add 814  find 294  remove 698  intersect 3 7 5 16 11 9 9 19 4  intersect 2 0 3 16 2  clear  find 745  count  union 3 7 5 16 11 9 9 19 4  intersect 17 10 13  intersect 10 16 12 2 7 13 19 1 8  union 7 18 4 9 0  union 0 6 10 16  elements  remove 645  add 290  remove 508  remove 369  add 596  clear  intersect 10 12 14 18 7  add 2  union 0 2  add 722  intersect 11 10  remove 30  union 8  union 12 12 11  remove 326  find 726  count  count  remove 977  add 745  intersect 6 18 7 19 15 10 10  add 189  add 725  clear  add 294  remove 199  intersect 1 19 5 7 17 16 1  add 299  elements  find 320  add 615  find 686  union 8 3 19 2 6 16 8  add 43  clear  intersect 2 2 10 3 5 14 10  union 17 10 13  add 949  elements  intersect 8  union 11 10  clear  clear  find 662  remove 400  remove 507  union 19 6 13 7 15 18  find 187  union 2 9 15  elements  find 362  add 775  add 120  elements  count  union 11 10  union 13 17 3  count  intersect 5 13 12 6 9  remove 696  remove 808  union 1 2 13 13 0 4 10 8 8  count  union 13  remove 748  clear  find 144  find 236  elements  count  count  clear  clear  union 17 1 1 4 4 12  clear  clear  clear  remove 739  add 640  remove 147  union 17 1 1 4 4 12  add 730  intersect 4 13 15 16 4 4 11  remove 360  remove 642  union 3 0 0  remove 558  clear  add 266  find 757  intersect 13 3 16 1  remove 266  clear  intersect 10 9 7 12  remove 87  count  find 703  union 16 1 3 14 19 2 11 7  clear  intersect 16  add 713  remove 7  elements  intersect 11 16 9 11 13 4 19  elements  elements  remove 258  elements  add 307  find 607  elements  clear  count  find 562  clear  intersect 0 9 18 3 3  clear  count  count  intersect 2 15 8  elements  clear  union 15 5 1  elements  add 552  add 750  intersect 12 17 6 1 18  add 374  clear  clear | 6  6  6  False  False  4 8 11 422  4  False  False  7  False  1 2 9 11 12 17 18  True  1 7 13 17  1 7 13 17  False  False  0  False  2 3 9 15 18  False  6  False  False  111  False  0  False  False  0  False  0  False  False  3 4 5 8 14  False  False  False  9  16  16  False  False  0 1 4 5 6 8 10 11 12 13 16 17 18 19 617 630  False  5  0  False  False  0  0 1 8 14 17 18  False  False  0  0 2 3 16  4  0 2 3 16  0 2 3 16 524  False  6  0 2 3 16 18 524 532  8  False  0 2 3 16 18 31 524 532  False  0 2 3 16 18 31 166 524 532  9  0 2 3 16 18 31 166 524 532  False  3 4 8 12 14 15 16 18 19 257  False  False  False  False  False  False  0  False  False  False  1 5 7 16 17 18 19  1 5 7 16 17 18 19  1  False  1  False  False  0  False  False  False  False  False  False  1  False  225  59 225  59 225 348 642  59 225 348 642  False  0  False  False  False  0  False  8  8  False  0  False  0  0  495 923  2  False  2  495 923  2  False  False  0  False  False  False  False  0  False  0  False  0  False  2 8 15  3  False  False  False  False  3  False  False  0  0  False  False  False  False  False  1  1  10 741  False  3 4 5 7 9 10 11 16 19 741  3 4 5 7 9 10 11 16 19 741  1  False  9  False  0 1 2 3 5 7 8 9 10 11 12 13 14 15 701  1 6 12 17 18  False  False  False  5  False  False  False  10  False  1 6 7 10 11 12 14 17 18 832  2  False  13 14  False  3  False  False  13 14 788 977  13 14 788 977  13 14 788 977  4  2 5 14  3  2 5 14  False  2 5 14  2  False  1  False  0  False  False  False  False  False  False  False  False  False  False  4 8 11 12 15 16 18  7  False  7  8  False  11  False  False  False  False  0  0 4 6 7 9 10 16 18  False  False  False  False  False  False  3  3  False  False  299  False  False  10 13 17 949  False  False  False  False  2 6 7 9 13 15 18 19  False  2 6 7 9 13 15 18 19 120 775  10  14  False  False  9  False  False  False  0  0  False  False  False  False  False  False  False  False  0  False  False  713  False  False  307  0  False  0  0  1 5 15 |
| **Вход** | **Изход** |
| 733  remove 85  elements  find 729  find 54  find 295  count  find 218  find 103  union 18 6 16 17 10 8 10 18  count  find 751  count  intersect 18 6 16 17 10 8 10 18  count  count  add 762  add 335  intersect 15 5 1  count  clear  remove 783  add 848  find 808  find 842  union 7 9 12 12 14 0 12 12  union 6 11  find 977  count  union 7 18 4 9 0  clear  count  intersect 8 3 19 2 6 16 8  intersect 15 10 16 11 5  intersect 6 11  intersect 2 2 10 3 5 14 10  elements  find 718  clear  clear  add 818  intersect 7 13 9  add 866  add 321  elements  elements  find 881  intersect 10 16 12 2 7 13 19 1 8  intersect 9 1 9 5  clear  remove 972  count  clear  remove 597  clear  find 206  elements  union 19 6 13 7 15 18  find 434  elements  remove 36  elements  union 15 15 13 14 5 7 9 4 19  clear  clear  find 594  intersect 6 11  add 370  find 989  clear  elements  remove 430  add 746  remove 90  union 5 2  remove 264  intersect 12 5 6 18 9 6 11  remove 935  clear  find 452  clear  intersect 6 18 7 19 15 10 10  count  elements  add 768  find 640  union 8 16  find 174  elements  count  find 762  add 19  find 230  add 945  count  find 778  remove 717  clear  remove 900  remove 637  elements  elements  count  add 785  remove 411  remove 270  union 11 14 1 5 10 16  remove 736  count  remove 653  find 537  elements  find 92  count  clear  intersect 14 12 6 7 3 0 19 6  intersect 19 8 0 13 18 6 19  intersect 5 5 12 9  intersect 15 10 16 11 5  intersect 17 13 1 7  intersect 3 4 17 9 8 2 19 1  add 20  find 976  union 8  add 960  remove 542  elements  union 0 2  elements  add 166  intersect 8 3 19 2 6 16 8  intersect 13 10 1 11 14 2 10 13 3  union 11 14 1 5 10 16  remove 789  add 126  union 11 16 9 11 13 4 19  find 367  clear  count  elements  elements  count  union 11 19 16 18 16 11 9 14  clear  count  elements  elements  remove 238  remove 351  add 585  intersect 11 5 9 9 4 16 12 2 8  union 16  intersect 13 14  remove 560  union 9 12 17 9 2 18 1  clear  elements  clear  elements  intersect 19 4 5 0 12  elements  elements  intersect 8 11 19 19 16 8 1 10 13  union 10 9 7 12  find 100  count  intersect 11 5 9 9 4 16 12 2 8  clear  find 169  add 438  elements  clear  intersect 17 10 13  union 8 11 19 19 16 8 1 10 13  intersect 5 11 5 0  clear  remove 586  elements  find 605  clear  elements  add 703  remove 380  clear  remove 855  add 555  clear  find 901  count  union 6 3 2 12 0 5 9 9 13  find 632  count  add 51  add 624  intersect 18  add 780  count  find 158  find 621  clear  remove 60  find 731  intersect 3 18  intersect 8  union 5 13 12 6 9  union 15 15 13 14 5 7 9 4 19  find 948  union 3  count  add 326  remove 575  clear  intersect 3 0 0  intersect 1 6  remove 820  count  find 888  add 978  intersect 8  count  remove 393  clear  elements  remove 422  remove 297  elements  intersect 16 3 11 1 2 10 1 5 18  count  add 352  count  add 146  remove 14  intersect 17 10 13  elements  elements  union 1  add 482  count  elements  clear  add 579  remove 582  clear  intersect 18 6 16 17 10 8 10 18  remove 21  count  count  clear  clear  add 423  count  intersect 8 11 19 19 16 8 1 10 13  remove 842  elements  union 14 5 4 8 14  intersect 16 1 3 14 19 2 11 7  find 508  elements  clear  remove 940  count  find 329  union 16 13 3 17 8 10  intersect 0 4 3  intersect 7 18 4 9 0  clear  intersect 8 18 2  intersect 6 16 0 12 12 2  union 7 18 4 9 0  intersect 17 10 13  count  count  union 7 9 12 12 14 0 12 12  add 668  find 789  clear  union 6 3 2 12 0 5 9 9 13  remove 534  union 18 1 18 14  count  add 142  count  find 246  find 335  elements  elements  remove 144  find 927  count  count  add 714  union 8 16  add 231  count  remove 661  count  find 260  intersect 7 13 9  add 21  add 539  union 0 2  clear  count  remove 998  intersect 18 19  intersect 19 11 8 0 1 13 8 9  intersect 1 2 13 13 0 4 10 8 8  add 861  remove 462  add 592  intersect 6 0 14 5 18 17 19 11  union 11 5 9 9 4 16 12 2 8  intersect 9 9 9 2 19 10  clear  remove 858  count  clear  count  intersect 8 18 2  add 880  remove 566  clear  elements  find 710  union 10  find 146  clear  count  count  clear  elements  remove 600  find 196  intersect 6 11  union 5 13 12 6 9  union 19 4 5 0 12  add 140  union 1  clear  count  clear  find 132  clear  intersect 9 9 9 2 19 10  count  count  add 644  clear  clear  union 10 16 12 2 7 13 19 1 8  find 70  remove 204  count  union 13  add 335  add 608  intersect 12 5 6 18 9 6 11  remove 298  clear  add 815  elements  elements  elements  union 5 5 12 9  elements  count  find 391  remove 82  add 371  count  count  find 121  add 807  find 132  elements  intersect 0 4 3  add 124  elements  add 965  intersect 10 7 19  clear  union 15 5 1  clear  union 1  union 2 9 15  find 39  union 17 10 13  add 985  count  union 0 4 3  clear  find 216  remove 762  clear  union 13 17 3  add 523  clear  elements  elements  count  clear  clear  remove 539  find 685  clear  find 50  find 993  find 404  find 652  union 12 12 11  intersect 18 6 16 17 10 8 10 18  clear  find 488  union 0 2  intersect 17 13 1 7  add 554  clear  intersect 6 3 2 12 0 5 9 9 13  add 423  elements  count  union 8 11 19 19 16 8 1 10 13  find 752  elements  elements  count  find 827  remove 344  count  remove 380  find 50  union 14 10 18 1 0 12 10  find 777  add 863  union 16 3 11 1 2 10 1 5 18  find 683  add 800  count  remove 907  elements  clear  count  elements  elements  add 121  clear  clear  count  add 828  remove 436  elements  union 16 13 3 17 8 10  count  intersect 5  union 5 11 5 0  add 189  intersect 11 19 16 18 16 11 9 14  union 1  remove 884  find 203  clear  find 350  union 15 15 13 14 5 7 9 4 19  find 470  add 609  elements  intersect 8  elements  add 379  remove 474  elements  intersect 2 0 3 16 2  find 864  remove 19  find 988  add 864  remove 764  remove 740  intersect 15 3  remove 943  add 287  clear  union 4 15 2 3 7 12 1 0  intersect 14 5 4 8 14  union 4 5 15 19 13 12  find 223  intersect 15 5 1  remove 882  remove 50  intersect 2 17 15 10  union 6 3 2 12 0 5 9 9 13  remove 212  add 387  clear  union 9 9 9 2 19 10  union 3 7 5 16 11 9 9 19 4  intersect 15 15 13 14 5 7 9 4 19  intersect 8 16  count  count  remove 112  intersect 15 5 1  add 523  intersect 16 1 3 14 19 2 11 7  intersect 11 16 9 11 13 4 19  count  elements  elements  elements  union 2 15 8  add 558  intersect 16 3 11 1 2 10 1 5 18  add 492  remove 129  add 941  add 68  union 0 9 18 3 3  add 252  count  union 7 9 12 12 14 0 12 12  elements  elements  add 624  clear  find 288  remove 149  find 711  elements  union 5  elements  add 215  clear  find 112  intersect 8 11 19 19 16 8 1 10 13  union 14 8 11 14 17 4  count  find 799  remove 648  count  elements  intersect 1 6  add 752  elements  add 934  count  remove 785  count  count  union 1  elements  find 675  union 15 15 13 14 5 7 9 4 19  intersect 6 16 0 12 12 2  union 16  add 159  count  find 488  count  union 2 9 15  union 19 17 0 10 9 18 12 17  clear  intersect 8 11 19 19 16 8 1 10 13  union 11 10  elements  elements  remove 400  count  remove 724  clear  add 256  count  elements  add 545  clear  remove 287  count  clear  elements  clear  union 4 18 10 9 9 19 10 18 18  find 32  union 8 11 19 19 16 8 1 10 13  find 219  count  find 200  intersect 13 17 3  intersect 6 3 2 12 0 5 9 9 13  clear  count  find 255  remove 566  count  count  remove 207  clear  find 164  clear  count  union 16 13 3 17 8 10  union 19 11 8 0 1 13 8 9  count  find 835  remove 567  clear  remove 374  intersect 2 17 15 10  elements  count  add 752  find 790  add 740  remove 576  add 528  remove 116  intersect 3 7 5 16 11 9 9 19 4  remove 268  clear  elements  intersect 8 3 19 2 6 16 8  add 986  clear  union 18 1 18 14  intersect 12 5 6 18 9 6 11  union 11 19 16 18 16 11 9 14  count  remove 435  remove 25  find 711  union 17 1 1 4 4 12  count  elements  intersect 12 17 6 1 18  add 672  add 718  clear  find 241  add 773  intersect 7 9 12 12 14 0 12 12  elements  add 103  count  union 11 19 16 18 16 11 9 14  count  intersect 11 10  clear  intersect 4 5 15 19 13 12  elements  union 19 19 8 17 11 6 1 15 8  union 2 0 3 16 2  clear  intersect 5 13 12 6 9  elements  count  elements  elements  elements  union 16 15 11 4 11 18 8  remove 404  find 47  find 509  find 440  elements  remove 551  add 759  elements  add 179  clear  count  clear  add 974  union 9 9 9 2 19 10  union 9 14 4 15 5 6 10 3  add 59  add 729  count  count  count  add 66  intersect 14 10 18 1 0 12 10  count  find 414  union 14 10 18 1 0 12 10  remove 868  remove 48  find 11  intersect 5 13 12 6 9  add 331  intersect 11 14 1 5 10 16  clear  add 579  clear  intersect 13 10 1 11 14 2 10 13 3  find 450  find 710  intersect 13 14  remove 4  union 0 9 18 3 3  union 17 19 13 18 1  count  intersect 6 11  union 9 12 17 9 2 18 1  elements  clear  clear  add 990  count  remove 707  intersect 7 18 4 9 0  intersect 18 6 16 17 10 8 10 18  add 282  elements  remove 913  elements  count  add 593  add 82  union 12 12 11  remove 703  count  add 167  elements  clear  elements  remove 704  elements  count  clear  find 213  count  add 982  intersect 6 18 7 19 15 10 10  clear  union 3  union 6 16 0 12 12 2 | False  False  False  False  0  False  False  6  False  6  6  6  0  False  False  False  False  8  0  False  321 866  321 866  False  False  0  False  False  False  6 7 13 15 18 19  False  6 7 13 15 18 19  False  False  False  False  False  False  False  0  False  False  8 16 768  3  False  False  5  False  False  False  False  0  False  False  False  7  False  False  1 5 10 11 14 16 785  False  7  False  False  8 20 960  0 2 8 20 960  False  False  0  0  0  False  False  False  False  4  False  438  False  False  False  False  False  0  False  8  1  False  False  False  False  False  11  False  False  0  False  0  False  False  False  0  1  False  2  1 482  False  False  0  0  1  False  False  14  False  0  False  0  0  False  False  11  12  False  False  0 1 2 3 5 6 9 12 13 14 18 142  0 1 2 3 5 6 9 12 13 14 18 142  False  False  12  12  16  False  16  False  0  False  False  False  0  0  False  False  False  0  0  False  False  0  False  0  0  False  False  9  False  815  815  815  5 9 12 815  4  False  False  5  5  False  False  5 9 12 371 807 815  124  False  8  False  False  0  False  False  False  False  False  False  False  423  1  False  1 8 10 11 13 16 19 423  1 8 10 11 13 16 19 423  8  False  False  8  False  False  False  False  17  False  0 1 2 3 5 8 10 11 12 13 14 16 18 19 423 800 863  0  0  False  828  7  False  False  False  False  4 5 7 9 13 14 15 19 609  False  379  False  False  False  False  False  False  False  False  False  False  0  0  False  0  False  9  0 2 3 7 9 12 14 18 68 252 492 941  0 2 3 7 9 12 14 18 68 252 492 941  False  False  False  5  False  5  False  False  5  4 8 11 14 17  752  2  False  2  2  1 752 934  False  2  False  2  10 11  10 11  False  2  False  1  256  False  0  False  False  10  False  0  False  False  0  0  False  False  0  11  False  False  False  0  False  False  False  False  6  False  False  False  10  1 4 9 11 12 14 16 17 18 19  False  1  7  0  False  False  False  False  4 8 11 15 16 18  False  4 8 11 15 16 18 759  0  13  13  13  2  False  False  False  False  False  False  False  8  1 2 9 12 17 18  1  False  282  False  282  1  False  5  11 12 82 167 282 593  False  0  False  0 |
| **Вход** | **Изход** |
| 993  add 317  intersect 10 12 14 18 7  clear  intersect 18 6 16 17 10 8 10 18  remove 320  clear  remove 687  add 858  union 15 10 16 11 5  remove 863  clear  clear  count  intersect 9 14 4 15 5 6 10 3  add 508  clear  elements  elements  clear  intersect 11 10  count  count  union 3  find 889  find 779  union 11  elements  remove 580  remove 42  clear  clear  intersect 12 5 6 18 9 6 11  clear  remove 466  count  intersect 8 18 2  intersect 19 19 8 17 11 6 1 15 8  add 908  elements  clear  union 4 18 10 9 9 19 10 18 18  elements  add 455  remove 24  remove 454  intersect 3 7 5 16 11 9 9 19 4  elements  union 16 13 3 17 8 10  clear  elements  intersect 6 18 7 19 15 10 10  add 332  add 709  count  remove 666  add 946  clear  clear  add 359  intersect 16 3 11 1 2 10 1 5 18  count  remove 705  clear  count  clear  count  clear  find 433  union 8 18 2  clear  find 607  intersect 6 11  add 597  intersect 4 18 10 9 9 19 10 18 18  find 962  remove 676  find 352  find 460  union 7 18 4 9 0  find 213  count  find 872  intersect 18 8 3 4 12 15 19 16 14  clear  elements  elements  intersect 14 8 11 14 17 4  remove 488  add 117  union 10 16 12 2 7 13 19 1 8  intersect 18 1 18 14  add 762  add 184  union 15 10 16 11 5  remove 936  union 11 16 9 11 13 4 19  intersect 0 9 18 3 3  intersect 17 13 1 7  count  add 385  elements  union 5 11 5 0  clear  find 718  elements  intersect 12 5 6 18 9 6 11  union 6 11  union 15 10 16 11 5  union 19 11 8 0 1 13 8 9  union 17 19 13 18 1  remove 730  count  elements  intersect 7 16 17 2  find 379  intersect 11 10  add 643  intersect 13 14  remove 969  union 4 15 2 3 7 12 1 0  clear  intersect 4 5 15 19 13 12  clear  add 116  remove 844  union 0 4 3  remove 393  clear  union 14 10 18 1 0 12 10  intersect 2 17 15 10  find 884  find 185  count  clear  count  union 17 13 1 7  intersect 10  add 482  clear  union 8  elements  find 844  intersect 13 7 14 5 12 14 1 15  union 5 5 12 9  clear  elements  elements  add 96  find 82  remove 194  add 434  intersect 3 7 5 16 11 9 9 19 4  remove 553  find 306  elements  elements  elements  remove 205  intersect 16 13 3 17 8 10  intersect 2 0 3 16 2  intersect 0 2  remove 604  elements  add 796  intersect 5 13 12 6 9  remove 325  clear  add 205  elements  find 973  elements  add 816  clear  remove 380  add 537  intersect 8 11 19 19 16 8 1 10 13  union 2 17 15 10  find 92  union 18  find 652  find 46  clear  count  find 993  remove 522  remove 74  intersect 12 5 6 18 9 6 11  union 5 11 5 0  intersect 11 16 9 11 13 4 19  elements  add 34  add 498  count  remove 66  add 276  add 68  find 182  clear  remove 589  clear  clear  find 384  union 3 18  intersect 15 10 16 11 5  intersect 15 15 13 14 5 7 9 4 19  elements  union 5 11 5 0  add 741  elements  count  count  clear  add 497  count  count  intersect 1 2 13 13 0 4 10 8 8  count  add 914  count  add 97  find 426  remove 185  find 377  intersect 18  find 211  union 4 15 2 3 7 12 1 0  count  remove 320  add 239  remove 114  count  elements  add 249  add 397  remove 645  intersect 14 8 11 14 17 4  clear  elements  count  union 16 15 11 4 11 18 8  clear  remove 677  intersect 12 14 19 15  clear  remove 55  count  elements  intersect 16 8  add 496  count  add 867  clear  add 886  add 421  count  count  intersect 15 15 13 14 5 7 9 4 19  union 11 5 9 9 4 16 12 2 8  clear  elements  remove 492  add 142  intersect 16 15 11 4 11 18 8  find 388  add 536  elements  elements  elements  remove 250  elements  remove 149  union 4 18 10 9 9 19 10 18 18  union 10 16 12 2 7 13 19 1 8  add 755  elements  add 142  find 63  count  intersect 10 16 12 2 7 13 19 1 8  clear  count  clear  remove 326  elements  union 13 14  union 12 12 11  clear  clear  elements  count  clear  intersect 13 3 16 1  intersect 3  clear  remove 963  count  elements  find 336  remove 684  intersect 16 1 3 14 19 2 11 7  remove 839  union 10 12 14 18 7  find 676  union 18 19  union 1  find 460  elements  count  intersect 19 4 5 0 12  intersect 1 19 5 7 17 16 1  clear  remove 516  remove 355  remove 11  clear  add 629  elements  elements  union 13 17 3  remove 726  count  union 9 9 9 2 19 10  find 790  intersect 3 7 5 16 11 9 9 19 4  add 158  find 152  intersect 5 5 12 9  elements  count  intersect 19 4 5 0 12  clear  add 548  find 71  find 426  clear  intersect 17 4 8 11 7 0 1  add 948  union 15 5 1  find 119  count  add 81  union 19 6 13 7 15 18  elements  union 5 2  find 94  intersect 0 9 18 3 3  count  clear  add 442  add 434  add 927  intersect 18 8 3 4 12 15 19 16 14  add 219  find 832  elements  count  elements  add 497  intersect 16 3 11 1 2 10 1 5 18  union 1 17 18 0 14 8  elements  add 122  count  union 13  remove 951  elements  clear  remove 417  remove 627  union 3  count  clear  find 326  intersect 5 11 5 0  intersect 12 14 19 15  clear  elements  clear  remove 352  clear  add 353  find 647  add 336  elements  remove 460  clear  find 363  add 602  add 414  union 19 4 5 0 12  remove 270  remove 218  remove 419  elements  elements  count  intersect 14 8 11 14 17 4  union 11  add 599  find 548  elements  add 675  clear  remove 848  elements  add 910  intersect 9 14 4 15 5 6 10 3  intersect 3 4 17 9 8 2 19 1  count  count  remove 997  elements  add 326  intersect 11 19 16 18 16 11 9 14  elements  union 12 17 6 1 18  add 168  union 2 17 15 10  union 5  intersect 18 1 18 14  add 141  find 956  add 962  find 309  add 381  clear  find 85  elements  clear  find 370  intersect 0 9 18 3 3  clear  add 698  elements  add 22  find 243  union 18 8 3 4 12 15 19 16 14  remove 171  find 742  count  count  add 738  remove 978  elements  union 2 9 15  intersect 9 12 17 9 2 18 1  find 165  add 106  clear  count  find 919  remove 247  union 1  count  remove 933  clear  union 10 9 7 12  elements  union 19 8 0 13 18 6 19  add 744  elements  intersect 4 18 10 9 9 19 10 18 18  union 16 15 11 4 11 18 8  intersect 6 3 2 12 0 5 9 9 13  intersect 13 17 3  elements  count  clear  intersect 1  count  count  count  elements  remove 183  find 476  intersect 11  find 432  remove 272  elements  add 5  find 322  find 108  remove 988  find 391  add 150  find 634  find 21  intersect 17 13 1 7  remove 582  clear  intersect 14 5 4 8 14  elements  elements  count  find 932  union 7 18 4 9 0  clear  find 854  elements  add 941  intersect 6 0 14 5 18 17 19 11  find 250  intersect 18  union 4 18 10 9 9 19 10 18 18  count  add 104  intersect 14 10 18 1 0 12 10  intersect 0 2  remove 109  union 12 14 19 15  count  count  clear  find 172  union 5  count  add 819  clear  remove 454  clear  find 269  find 640  add 771  find 107  count  intersect 12 5 6 18 9 6 11  count  clear  find 948  union 19 8 0 13 18 6 19  remove 164  union 17 1 1 4 4 12  union 17 10 13  elements  remove 602  find 898  union 10 9 7 12  clear  union 17 4 8 11 7 0 1  count  elements  clear  count  union 15 15 13 14 5 7 9 4 19  elements  intersect 17 13 1 7  elements  union 1 2 13 13 0 4 10 8 8  add 29  elements  remove 309  clear  count  count  intersect 19 19 8 17 11 6 1 15 8  union 8 3 19 2 6 16 8  clear  find 402  remove 569  find 473  count  count  find 399  clear  find 577  find 262  count  intersect 10 9 7 12  union 15 8 8 4  remove 234  clear  clear  clear  remove 142  remove 605  intersect 2 2 10 3 5 14 10  count  find 590  remove 701  clear  remove 650  clear  clear  find 535  union 19 6 13 7 15 18  intersect 4 15 2 3 7 12 1 0  add 974  elements  add 46  add 510  count  count  intersect 3  elements  add 331  elements  clear  union 5 11 5 0  remove 923  elements  count  clear  union 15 8 8 4  add 201  add 982  union 7 9 12 12 14 0 12 12  count  union 6 16 0 12 12 2  add 358  union 14 5 4 8 14  find 213  elements  find 197  intersect 18 1 18 14  remove 593  count  union 3  intersect 17 4 8 11 7 0 1  add 950  union 7 9 12 12 14 0 12 12  find 204  clear  elements  intersect 9 14 4 15 5 6 10 3  count  find 885  union 17 10 13  find 295  clear  intersect 18 19  clear  add 936  clear  elements  union 13 3 16 1  count  clear  add 381  count  intersect 6 0 14 5 18 17 19 11  add 776  elements  add 944  clear  remove 430  find 485  count  intersect 11 5 9 9 4 16 12 2 8  add 62  count  elements  add 17  elements  add 27  add 133  elements  union 3 4 17 9 8 2 19 1  remove 440  intersect 6 3 2 12 0 5 9 9 13  add 606  clear  union 6 18 7 19 15 10 10  clear  count  clear  remove 639  count  union 0 4 3  find 206  union 2 15 8  count  remove 112  remove 127  intersect 17 10 13  add 761  intersect 15 15 13 14 5 7 9 4 19  count  remove 929  elements  clear  remove 59  count  find 345  clear  union 1 19 5 7 17 16 1  clear  union 10 16 12 2 7 13 19 1 8  elements  remove 564  union 8 11 19 19 16 8 1 10 13  add 319  count  add 694  intersect 13 3 16 1  union 1  union 7 13 9  intersect 9 1 9 5  remove 38  union 1 6  add 85  find 57  remove 586  clear  union 2 2 10 3 5 14 10  intersect 16 8  clear  remove 650  count  add 327  count  elements  intersect 6 11  elements  clear  add 403  add 673  elements  elements  clear  count  union 0 2  union 8 18 2  find 262  union 13 7 14 5 12 14 1 15  union 0 2  find 273  add 546  count  elements  add 506  union 8 11 19 19 16 8 1 10 13  count  add 955  remove 189  clear  remove 654  remove 912  union 14 5 4 8 14  intersect 16  union 4 13 15 16 4 4 11  union 19 6 13 7 15 18  union 3  clear  find 213  count  find 621  find 554  count  add 651  find 225  intersect 16 15 11 4 11 18 8  clear  union 11 14 1 5 10 16  add 915  elements  add 439  intersect 5 11 5 0  union 14 10 18 1 0 12 10  clear  intersect 18 8 3 4 12 15 19 16 14  remove 640  intersect 3  count  union 6 11  intersect 15 3  clear  count  intersect 12 12 11  count  remove 264  clear  add 580  count  count  remove 302  intersect 6 11  clear  add 394  count  intersect 16 13 3 17 8 10  elements  union 1 17 18 0 14 8  union 2 9 15  clear  find 653  remove 706  intersect 13 10 1 11 14 2 10 13 3  clear  intersect 13 14  clear  count  clear  union 9 1 9 5  find 921  union 9 1 9 5  add 338  elements  elements  union 14 8 11 14 17 4  find 678  add 389  count  add 607  clear  count  union 10  remove 243  find 388  union 14 5 4 8 14  add 667  elements  intersect 3  find 708  union 2 9 15  add 773  union 9 12 17 9 2 18 1  clear  find 27  union 5 2  count  find 122  clear  count  elements  union 12 14 19 15  add 920  add 677  count  union 7 18 4 9 0  clear  elements  remove 681  intersect 11 10  count  remove 646  count  elements  intersect 12 5 6 18 9 6 11  clear  add 742  remove 525  count  count  count  union 8 16  find 957  count  clear  find 787  union 10 16 12 2 7 13 19 1 8  intersect 17 13 1 7  remove 124  union 12 17 6 1 18  remove 933  clear  elements  count  find 398  remove 153  intersect 4 15 2 3 7 12 1 0  elements  count  intersect 4 5 15 19 13 12  elements  find 146  elements  clear  intersect 18 1 18 14  union 0 9 18 3 3  intersect 19 4 5 0 12  elements  intersect 19 11 8 0 1 13 8 9  intersect 14 8 11 14 17 4  find 403  clear  elements  clear  union 12 14 19 15  add 191  add 187  intersect 18 8 3 4 12 15 19 16 14  intersect 5  clear  elements  count  elements  clear  add 242  add 302  clear  remove 454  add 588  find 542  count  find 206  remove 592  clear  intersect 4 18 10 9 9 19 10 18 18  remove 175  add 690  clear  union 16 1 3 14 19 2 11 7  remove 323  find 948  add 675  count  count  find 209  remove 309  remove 305  count  count  find 697  find 954  find 109  clear  intersect 19 11 8 0 1 13 8 9  count  clear  clear  find 48  clear  clear  union 7 13 9  elements  count  union 6 16 0 12 12 2  find 866  add 225  union 11 19 16 18 16 11 9 14  remove 257  find 254  count  elements  clear  elements  add 686  clear  count  intersect 6 16 0 12 12 2  elements  elements  add 617  union 14 10 18 1 0 12 10  union 1 19 5 7 17 16 1  union 17 4 8 11 7 0 1  remove 62  clear  intersect 14 12 6 7 3 0 19 6  clear  elements  count  find 449  clear  intersect 4 15 2 3 7 12 1 0  remove 396  find 459  clear  clear  elements  count  union 4 2 7 13  add 733  clear  intersect 0 4 3  find 273  find 607  clear  intersect 4 13 15 16 4 4 11  add 380  union 13 7 14 5 12 14 1 15  find 804  remove 828  remove 126  add 188  union 5 2  remove 982  add 101  union 6 18 7 19 15 10 10  clear  union 10 12 14 18 7  add 771  intersect 2 2 10 3 5 14 10  union 0 9 18 3 3  add 901  count  elements  find 311  add 715  intersect 7 0 12 15 3 8  count  intersect 4 13 15 16 4 4 11  elements | False  False  False  0  0  0  False  False  3 11  False  False  False  0  908  4 9 10 18 19  False  False  4 9 19  2  False  0  False  0  0  False  False  False  False  False  False  False  5  False  False  False  0  385  False  False  14  0 1 5 6 8 9 10 11 13 15 16 17 18 19  False  False  False  False  False  False  1  0  8  False  False  False  False  False  False  False  False  205  False  205  False  False  False  False  0  False  False  False  11  3  False  False  False  False  0 5 11 741  4  4  1  1  0  1  False  False  False  False  8  False  False  9  0 1 2 3 4 7 12 15 239  False  0  False  False  0  1  2  2  False  False  536  536  536  False  536  False  1 2 4 7 8 9 10 12 13 16 18 19 536 755  False  15  0  False  0  False  0  False  False  False  False  False  1 7 10 12 14 18 19  7  False  False  False  629  629  False  4  False  False  9  1  False  False  False  4  1 5 6 7 13 15 18 19 81 948  False  1  False  219  1  219  0 1 8 14 17 18  7  False  0 1 8 13 14 17 18 122  False  False  1  False  False  False  336 353  False  False  False  False  False  0 4 5 12 19 414 602  0 4 5 12 19 414 602  7  False  4 11 599  False  0  0  False  False  False  False  False  698  False  False  False  11  11  False  3 4 8 12 14 15 16 18 19 22 698 738  False  0  False  False  1  False  7 9 10 12  0 6 7 8 9 10 12 13 18 19 744  0  0  0  0  False  False  False  False  False  False  False  False  False  False  False  0  False  False  False  5  False  4  4  False  1  False  False  False  False  1  0  False  False  0 1 4 6 8 10 12 13 17 18 19  False  False  7  0 1 4 7 8 11 17  0  4 5 7 9 13 14 15 19  7 13  0 1 2 4 7 8 10 13 29  False  0  0  False  False  False  0  0  False  False  False  0  False  False  False  0  False  False  False  False  7 15 974  5  5  331  False  0 5 11  3  10  False  0 2 4 5 6 7 8 9 12 14 15 16 201 358 982  False  False  1  False  0  False  False  4  1  776  False  False  0  1  62  17 62  17 27 62 133  False  0  False  0  False  6  False  False  0  False  False  0  False  1 2 7 8 10 12 13 16 19  False  11  False  False  False  False  0  1  327  403 673  403 673  0  False  False  12  0 1 2 5 7 8 12 13 14 15 18 546  17  False  False  False  False  0  False  False  0  False  1 5 10 11 14 16 915  False  0  0  0  False  1  1  False  1  False  False  0  False  1 5 9 338  1 5 9 338  False  10  0  False  False  4 5 8 10 14 667  False  False  2  False  0  6  False  0  False  0  False  1  1  1  False  3  False  False  False  0  False  False  0  False  0  False  0  False  False  1  False  False  False  False  False  9  9  False  False  False  9  9  False  False  False  0  False  7 9 13  3  False  False  False  13  0 2 6 7 9 11 12 13 14 16 18 19 225  0  False  0  False  False  False  0  False  False  False  False  False  False  7  0 3 9 10 14 18 901  False  2 |
| **Вход** | **Изход** |
| 902  add 82  add 34  add 18  add 37  add 88  add 40  add 73  add 39  add 96  add 94  add 34  add 98  add 42  add 14  add 41  add 39  add 38  add 35  add 84  add 90  add 58  add 58  add 44  add 45  add 40  add 74  add 76  add 74  add 46  add 28  add 90  add 96  add 13  add 55  add 47  add 80  add 10  add 82  add 94  add 74  add 68  add 50  add 92  add 53  add 51  add 38  add 41  add 50  add 15  add 93  add 58  add 82  add 54  add 85  add 87  add 45  add 50  add 45  add 15  add 39  add 67  add 16  add 35  add 14  add 23  add 26  add 18  add 80  add 11  add 62  add 67  add 80  add 60  add 28  add 50  add 96  add 97  add 65  add 81  add 50  add 33  add 98  add 36  add 35  add 19  add 15  add 37  add 92  add 17  add 91  add 92  add 74  add 83  add 70  add 85  add 99  add 34  add 40  add 42  add 72  add 68  add 42  add 38  add 88  add 50  add 63  add 49  add 50  add 96  add 33  add 17  add 23  add 65  add 17  add 44  add 94  add 44  add 74  add 30  add 51  add 21  add 35  add 57  add 30  add 77  add 10  add 49  add 75  add 15  add 29  add 58  add 87  add 43  add 39  add 43  add 50  add 76  add 23  add 34  add 51  add 23  add 40  add 94  add 94  add 42  add 68  add 69  add 69  add 60  add 23  add 95  add 82  add 29  add 47  add 33  add 84  add 92  add 80  add 50  add 59  add 34  add 98  add 18  add 47  add 45  add 18  add 52  add 44  add 18  add 54  add 43  add 74  add 81  add 94  add 77  add 91  add 30  add 13  add 90  add 92  add 56  add 98  add 98  add 96  add 53  add 59  add 69  add 29  add 68  add 96  add 69  add 51  add 91  add 32  add 19  add 43  add 47  add 53  add 61  add 37  add 32  add 36  add 52  add 78  add 40  add 95  add 18  add 96  add 77  add 58  add 19  add 69  add 22  add 73  add 15  add 22  add 45  add 66  add 39  add 91  add 92  add 61  add 86  add 94  add 91  add 47  add 74  add 41  add 56  add 18  add 16  add 65  add 27  add 82  add 47  add 61  add 73  add 45  add 52  add 86  add 60  add 88  add 68  add 69  add 24  add 97  add 21  add 14  add 94  add 62  add 43  add 96  add 11  add 33  add 64  add 76  add 77  add 45  add 18  add 66  add 90  add 47  add 55  add 46  add 42  add 63  add 37  add 62  add 43  add 51  add 91  add 80  add 71  add 97  add 58  add 85  add 70  add 44  add 94  add 93  add 53  add 94  add 28  add 39  add 59  add 43  add 72  add 19  add 66  add 38  add 89  add 29  add 64  add 54  add 26  add 34  add 55  add 35  add 47  add 23  add 11  add 49  add 93  add 19  add 50  add 40  add 69  add 36  add 36  add 59  add 16  add 10  add 93  add 23  add 62  add 20  add 92  add 22  add 98  add 21  add 73  add 35  add 35  add 76  add 99  add 19  add 17  add 14  add 79  add 48  add 12  add 29  add 76  add 96  add 67  add 18  add 77  add 73  add 37  add 68  add 30  add 46  add 64  add 91  add 23  add 39  add 49  add 45  add 52  add 63  add 48  add 18  add 20  add 80  add 13  add 20  add 86  add 75  add 36  add 22  add 49  add 37  add 87  add 99  add 75  add 90  add 17  add 19  add 40  add 34  add 80  add 21  add 63  add 65  add 50  add 73  add 45  add 54  add 98  add 95  add 71  add 31  add 79  add 11  add 80  add 34  add 61  add 43  add 69  add 40  add 99  add 21  add 99  add 44  add 29  add 97  add 68  add 31  add 73  add 73  add 29  add 78  add 57  add 16  add 15  add 98  add 84  add 54  add 16  add 40  add 97  add 92  add 82  add 13  add 98  add 81  add 21  add 46  add 71  add 46  add 26  add 62  add 53  add 41  add 34  add 55  add 50  add 34  add 60  add 88  add 97  add 26  add 27  add 11  add 92  add 60  add 90  add 39  add 80  add 85  add 77  add 57  add 35  add 47  add 84  add 96  add 62  add 11  add 11  add 13  add 81  add 46  add 48  add 55  add 86  add 15  add 64  add 71  add 77  add 99  add 71  add 91  add 11  add 13  add 41  add 76  add 68  add 27  add 37  add 61  add 90  add 18  add 54  add 67  add 37  add 25  add 38  add 71  add 74  add 35  add 86  add 76  add 79  add 29  add 72  add 95  add 65  add 91  add 97  add 88  add 72  add 65  add 31  add 24  add 79  add 46  add 95  add 58  add 62  add 58  add 88  add 11  add 83  add 28  add 39  add 77  add 25  add 46  add 97  add 28  add 48  add 43  add 24  add 61  add 16  add 79  add 14  add 13  add 37  add 79  add 74  add 17  add 74  add 18  add 16  add 39  add 51  add 52  add 20  add 62  add 17  add 68  add 60  add 17  add 38  add 29  add 44  add 22  add 74  add 55  add 63  add 17  add 34  add 87  add 54  add 18  add 35  add 54  add 81  add 89  add 27  add 33  add 80  add 14  add 60  add 41  add 35  add 58  add 97  add 50  add 60  add 73  add 19  add 83  add 21  add 27  add 14  add 71  add 75  add 34  add 36  add 81  add 65  add 30  add 19  add 71  add 92  add 75  add 26  add 79  add 47  add 73  add 35  add 21  add 11  add 42  add 37  add 93  add 93  add 76  add 53  add 66  add 81  add 49  add 54  add 56  add 49  add 65  add 39  add 75  add 81  add 61  add 13  add 91  add 76  add 59  add 25  add 64  add 72  add 35  add 60  add 62  add 39  add 39  add 80  add 28  add 95  add 45  add 69  add 72  add 16  add 68  add 69  add 68  add 63  add 34  add 49  add 14  add 61  add 94  add 62  add 75  add 98  add 59  add 26  add 57  add 34  add 31  add 18  add 22  add 90  add 55  add 72  add 78  add 16  add 77  add 47  add 37  add 28  add 37  add 51  add 70  add 90  add 18  add 26  add 97  add 66  add 63  add 36  add 17  add 62  add 97  add 57  add 92  add 17  add 47  add 97  add 87  add 81  add 51  add 77  add 40  add 43  add 33  add 65  add 98  add 80  add 75  add 66  add 81  add 10  add 96  add 10  add 37  add 77  add 38  add 91  add 45  add 71  add 52  add 43  add 50  add 98  add 49  add 18  add 69  add 45  add 78  add 77  add 67  add 24  add 14  add 88  add 94  add 79  add 77  add 41  add 89  add 62  add 31  add 37  add 73  add 68  add 74  add 60  add 20  add 72  add 91  add 16  add 11  add 68  add 13  add 70  add 65  add 38  add 22  add 89  add 38  add 77  add 68  add 24  add 90  add 76  add 64  add 85  add 83  add 15  add 79  add 51  add 68  add 76  add 45  add 57  add 71  add 58  add 25  add 54  add 94  add 17  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add 49  add 41  add 26  add 14  add 73  add 69  add 10  add 45  add 48  add 38  add 56  add 38  add 38  add 71  add 11  add 49  add 28  add 29  add 67  add 33  add 57  add 88  add 19  add 62  add 80  add 16  add 20  count | False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  False  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| **Вход** | **Изход** |
| 1000  elements  add 122  intersect 1 6  remove 935  intersect 10 7 19  elements  add 644  remove 401  elements  elements  add 609  count  add 131  count  add 254  count  find 464  union 4 18 10 9 9 19 10 18 18  clear  clear  elements  count  elements  intersect 19 8 0 13 18 6 19  elements  union 18 8 3 4 12 15 19 16 14  elements  count  intersect 16 15 11 4 11 18 8  add 808  count  clear  intersect 11 14 1 5 10 16  union 11 10  clear  elements  union 13 17 3  union 5 5 12 9  intersect 4 18 10 9 9 19 10 18 18  union 1 17 18 0 14 8  remove 289  remove 381  count  find 402  clear  union 13 3 16 1  find 292  count  intersect 12 14 19 15  count  add 446  add 832  union 17 10 13  intersect 19 17 0 10 9 18 12 17  elements  add 539  intersect 18  count  add 67  clear  count  elements  clear  union 6 16 0 12 12 2  union 8 11 19 19 16 8 1 10 13  count  count  union 2 17 15 10  remove 315  union 12 5 6 18 9 6 11  union 0 4 3  add 421  find 914  count  add 448  remove 414  add 856  clear  find 537  elements  remove 722  add 895  intersect 13 10 1 11 14 2 10 13 3  find 765  remove 625  find 545  add 703  union 4 2 7 13  union 6 3 2 12 0 5 9 9 13  union 18  union 10 12 14 18 7  union 19 17 0 10 9 18 12 17  elements  add 372  count  clear  elements  union 14 5 4 8 14  count  elements  elements  clear  union 17 19 13 18 1  elements  elements  clear  union 13 14  remove 666  clear  find 626  intersect 16 3 11 1 2 10 1 5 18  count  find 737  find 238  union 11 19 16 18 16 11 9 14  add 14  union 10  count  count  find 964  union 19 6 13 7 15 18  count  intersect 5 5 12 9  union 3 18  count  intersect 7 16 17 2  elements  remove 365  remove 380  union 10 9 7 12  find 843  union 17 10 13  add 772  union 19 8 0 13 18 6 19  clear  clear  elements  remove 749  find 489  intersect 4 2 7 13  elements  add 188  elements  union 15 15 13 14 5 7 9 4 19  clear  remove 973  intersect 17 10 13  remove 702  intersect 6 16 0 12 12 2  elements  find 726  remove 663  union 3 18  clear  clear  clear  clear  add 687  intersect 2 9 15  add 499  clear  add 346  remove 528  intersect 16 3 11 1 2 10 1 5 18  union 16 13 3 17 8 10  elements  add 915  find 847  intersect 17 1 1 4 4 12  remove 347  remove 709  count  count  clear  remove 505  union 15 10 16 11 5  count  add 852  find 959  intersect 10 9 7 12  intersect 3 18  find 371  find 553  elements  clear  find 750  clear  union 18  union 13 7 14 5 12 14 1 15  count  remove 506  union 19 6 13 7 15 18  remove 384  find 55  intersect 12 5 6 18 9 6 11  clear  clear  union 4 2 7 13  clear  add 153  union 8 3 19 2 6 16 8  count  find 968  elements  intersect 4 15 2 3 7 12 1 0  clear  union 15 3  union 5 13 12 6 9  clear  union 0 4 3  intersect 9 14 4 15 5 6 10 3  elements  remove 375  find 437  count  remove 613  clear  add 394  elements  count  count  find 542  find 661  clear  intersect 13  clear  elements  union 16 3 11 1 2 10 1 5 18  union 16  remove 949  find 873  count  intersect 11  union 9 9 9 2 19 10  intersect 11 16 9 11 13 4 19  clear  elements  add 355  find 748  remove 687  clear  union 5 2  remove 5  elements  elements  elements  count  remove 357  union 3 18  union 6 16 0 12 12 2  add 664  count  count  remove 29  remove 538  union 2 17 15 10  remove 72  clear  intersect 8 3 19 2 6 16 8  count  count  remove 63  count  elements  count  union 13  elements  count  intersect 15 5 1  remove 486  add 566  intersect 6 0 14 5 18 17 19 11  add 691  count  clear  add 658  count  add 597  clear  union 16 1 3 14 19 2 11 7  remove 184  add 114  count  find 601  clear  union 18 19  elements  intersect 14 12 6 7 3 0 19 6  add 155  union 13 14  count  union 1 19 5 7 17 16 1  count  remove 803  remove 996  clear  count  find 62  intersect 1 2 13 13 0 4 10 8 8  count  union 13 3 16 1  elements  union 16  count  remove 649  elements  remove 589  add 709  find 323  add 503  find 912  find 796  add 712  elements  find 773  add 621  count  count  find 902  remove 803  count  remove 104  find 82  elements  intersect 5 5 12 9  union 15 3  union 1 19 5 7 17 16 1  clear  clear  count  count  elements  clear  elements  add 382  clear  count  elements  remove 809  add 673  find 769  elements  union 10 9 7 12  elements  remove 9  elements  add 400  elements  clear  union 12 14 19 15  intersect 5 2  union 4 5 15 19 13 12  clear  find 943  remove 870  add 293  find 567  add 124  count  remove 896  count  clear  elements  elements  add 952  union 18 8 3 4 12 15 19 16 14  count  remove 864  count  elements  find 644  remove 392  intersect 0 2  union 19 4 5 0 12  remove 542  find 30  union 14 10 18 1 0 12 10  find 691  elements  intersect 12 5 6 18 9 6 11  count  add 428  count  remove 897  count  union 8 16  count  count  union 2 2 10 3 5 14 10  union 13 17 3  intersect 8 11 19 19 16 8 1 10 13  remove 675  remove 533  clear  remove 878  add 486  elements  remove 503  count  union 6 0 14 5 18 17 19 11  clear  elements  add 952  add 478  elements  find 568  elements  count  remove 157  elements  add 340  union 0 2  union 11 14 1 5 10 16  remove 422  remove 511  union 13 10 1 11 14 2 10 13 3  count  intersect 5 11 5 0  intersect 11 16 9 11 13 4 19  count  clear  intersect 18  find 638  add 781  remove 343  count  intersect 11 10  find 12  union 12 17 6 1 18  find 585  union 6 11  clear  count  add 81  union 13 10 1 11 14 2 10 13 3  remove 492  remove 83  clear  intersect 17 4 8 11 7 0 1  add 729  remove 757  clear  union 19 4 5 0 12  intersect 16 8  add 85  clear  union 0 9 18 3 3  union 17 1 1 4 4 12  add 420  find 85  remove 687  find 818  add 812  add 810  remove 955  remove 658  add 988  find 282  find 374  intersect 12 5 6 18 9 6 11  count  add 107  count  elements  find 928  find 604  union 10 16 12 2 7 13 19 1 8  union 12 17 6 1 18  union 12 14 19 15  remove 346  find 698  intersect 8  union 19 4 5 0 12  find 805  find 567  union 4 15 2 3 7 12 1 0  find 420  union 16  clear  elements  remove 579  count  elements  clear  elements  union 13 14  union 14 8 11 14 17 4  clear  clear  find 686  add 935  elements  union 19 11 8 0 1 13 8 9  remove 420  find 650  remove 513  elements  count  union 5 2  count  union 17 13 1 7  union 16 3 11 1 2 10 1 5 18  elements  union 0 9 18 3 3  clear  add 906  elements  clear  elements  intersect 13 14  elements  count  add 675  find 504  elements  clear  count  find 845  elements  elements  remove 697  union 5 11 5 0  elements  find 908  clear  elements  clear  union 18 8 3 4 12 15 19 16 14  intersect 6 0 14 5 18 17 19 11  clear  count  remove 878  clear  intersect 12 17 6 1 18  clear  union 1 6  add 771  union 16 3 11 1 2 10 1 5 18  clear  find 259  count  intersect 5 2  remove 406  count  elements  clear  clear  elements  union 2 9 15  clear  remove 364  union 13 14  find 408  intersect 14 8 11 14 17 4  remove 119  union 16 3 11 1 2 10 1 5 18  elements  find 961  count  union 4 5 15 19 13 12  elements  find 365  clear  find 593  add 165  elements  find 320  elements  elements  find 593  count  intersect 17 4 8 11 7 0 1  count  clear  remove 122  clear  union 3  union 12 12 11  find 416  union 11 5 9 9 4 16 12 2 8  remove 907  intersect 1 19 5 7 17 16 1  clear  count  union 1 17 18 0 14 8  add 156  count  clear  find 296  remove 241  remove 160  intersect 0 2  remove 69  add 780  intersect 2 15 8  union 4 15 2 3 7 12 1 0  intersect 0 9 18 3 3  clear  union 4 5 15 19 13 12  find 977  add 99  intersect 5 5 12 9  elements  add 784  add 378  count  clear  add 345  clear  find 180  remove 569  add 680  remove 799  elements  intersect 8  find 10  add 917  clear  find 353  add 319  count  count  clear  add 903  clear  clear  elements  union 0 2  remove 858  find 210  remove 934  count  count  add 731  union 0 6 10 16  add 930  find 467  add 712  count  intersect 15 5 1  remove 17  add 312  remove 638  count  union 8  count  remove 69  remove 572  union 9 1 9 5  intersect 18 1 18 14  elements  find 289  remove 324  clear  elements  add 611  union 8 16  find 810  intersect 13 3 16 1  elements  elements  intersect 1  elements  add 296  elements  clear  find 574  find 220  union 1  union 7 18 4 9 0  remove 984  count  find 398  elements  union 11 14 1 5 10 16  find 272  add 570  count  count  remove 548  add 439  clear  elements  union 4 13 15 16 4 4 11  union 15 5 1  find 776  elements  intersect 5 2  union 18 8 3 4 12 15 19 16 14  remove 961  add 107  intersect 19 4 5 0 12  clear  clear  add 148  elements  clear  intersect 8 18 2  find 283  count  count  intersect 15 15 13 14 5 7 9 4 19  remove 776  intersect 0 2  find 288  clear  elements  clear  add 942  count  union 19 17 0 10 9 18 12 17  intersect 8  count  add 521  elements  clear  elements  clear  intersect 5 13 12 6 9  find 938  find 996  find 674  clear  find 598  add 477  count  find 706  clear  add 603  elements  add 205  intersect 3  intersect 3 0 0  intersect 6 3 2 12 0 5 9 9 13  count  union 9 9 9 2 19 10  clear  find 245  add 817  add 349  add 976  count  remove 420  intersect 3 7 5 16 11 9 9 19 4  elements  remove 438  union 19 6 13 7 15 18  elements  elements  elements  elements  clear  clear  add 560  count  elements  count  remove 541  intersect 13 10 1 11 14 2 10 13 3  add 637  count  count  union 1 19 5 7 17 16 1  count  elements  union 14 5 4 8 14  union 14 5 4 8 14  elements  union 1 17 18 0 14 8  count  remove 406  union 18 1 18 14  elements  union 5  union 12 12 11  intersect 14 10 18 1 0 12 10  count  count  intersect 16 3 11 1 2 10 1 5 18  intersect 8  remove 53  remove 63  remove 87  union 19 19 8 17 11 6 1 15 8  add 304  count  elements  intersect 17 13 1 7  intersect 14 12 6 7 3 0 19 6  union 17 1 1 4 4 12  elements  intersect 9 1 9 5  union 19 6 13 7 15 18  count  clear  union 15 3  count  elements  union 9 9 9 2 19 10  add 813  count  union 1 19 5 7 17 16 1  clear  count  add 319  add 925  intersect 10 16 12 2 7 13 19 1 8  count  intersect 7 13 9  union 6 16 0 12 12 2  elements  find 953  intersect 13 17 3  clear  clear  union 11 19 16 18 16 11 9 14  clear  union 11 16 9 11 13 4 19  find 819  remove 459  count  add 587  remove 114  union 16  intersect 11 10  union 10  intersect 5 5 12 9  add 666  elements  count  clear  add 288  elements  count  intersect 9 12 17 9 2 18 1  add 30  clear  clear  find 86  clear  add 571  intersect 8 3 19 2 6 16 8  intersect 6 3 2 12 0 5 9 9 13  remove 524  count  intersect 1 6  count  remove 341  intersect 14 8 11 14 17 4  add 888  union 17 13 1 7  intersect 8 11 19 19 16 8 1 10 13  elements  clear  elements  remove 916  remove 83  count  add 338  clear  add 63  count  count  add 893  intersect 3  add 824  find 703  add 478  remove 306  find 483  union 10 9 7 12  add 794  remove 575  remove 91  find 203  add 440  add 861  intersect 2 0 3 16 2  count  remove 580  find 5  elements  intersect 11 16 9 11 13 4 19  union 13 3 16 1  clear  intersect 9 9 9 2 19 10  intersect 16  elements  union 18 1 18 14  remove 596  clear  remove 733  union 6 11  elements  find 628  intersect 11 10  intersect 19 4 5 0 12  intersect 3 0 0  remove 51  union 17 19 13 18 1  find 696  elements  intersect 5 5 12 9  find 999  find 243  union 14 8 11 14 17 4  add 778  remove 545  remove 46  elements  clear  elements  clear  add 588  count  find 99  count  add 9  remove 524  clear  count  union 17 10 13  clear  union 2 17 15 10  remove 356  union 8 16  union 4 15 2 3 7 12 1 0  add 641  intersect 7 16 17 2  add 601  find 404  clear  intersect 8 16  find 108  union 6 0 14 5 18 17 19 11  elements  count  elements  find 892  count  add 896  add 33  elements  clear  remove 617  count  remove 120  find 857  count  intersect 11 16 9 11 13 4 19  clear  add 408  elements  add 27  find 234  intersect 15 8 8 4  add 471  remove 117  union 16 15 11 4 11 18 8  intersect 10 12 14 18 7  elements  union 16 3 11 1 2 10 1 5 18  find 87  add 173  intersect 4 2 7 13  clear  remove 993  remove 454  find 719  union 5 11 5 0  add 992  add 54  find 872  count  find 506  intersect 12 14 19 15  add 615  add 615  remove 282  add 473  add 916  remove 725  remove 707  elements  elements  intersect 8 18 2  clear  add 591  find 690  elements  intersect 13 10 1 11 14 2 10 13 3  intersect 14 12 6 7 3 0 19 6  elements  remove 674  clear  remove 481  count  elements  count  find 971 | False  False  644  644  2  3  4  False  0  3 4 8 12 14 15 16 18 19  9  6  False  False  7  False  False  4  0  10 17  0  0  11  11  False  False  19  False  False  False  False  False  False  0 2 3 4 5 6 7 9 10 12 13 14 17 18 19 703  17  4  4 5 8 14  4 5 8 14  1 13 17 18 19  1 13 17 18 19  False  False  0  False  False  False  7  7  False  11  3  False  False  False  False  False  188  False  False  False  False  False  3 8 10 13 16 17  False  False  False  1  1  False  5  False  False  False  False  8  False  False  False  7  False  2 3 6 8 16 19 153  3 4  False  False  2  False  394  1  1  False  False  False  False  8  False  False  2  2  2  2  False  9  9  False  False  False  0  0  False  0  0  13  1  False  1  1  False  9  False  18 19  4  9  False  False  0  False  0  1 3 13 16  4  False  1 3 13 16  False  False  False  False  1 3 13 16 503 709 712  False  8  8  False  False  8  False  False  1 3 13 16 503 621 709 712  0  0  0  False  False  673  7 9 10 12 673  7 10 12 673  7 10 12 400 673  False  False  False  2  False  2  10  False  10  3 4 8 12 14 15 16 18 19 952  False  False  False  False  False  0 1 4 5 10 12 14 18 19  3  4  False  4  6  6  False  False  False  486  False  1  478 952  False  478 952  2  False  478 952  False  False  13  1  False  False  1  False  False  0  False  False  False  False  False  False  False  False  False  False  3  4  9 12 18 107  False  False  False  False  False  False  False  False  0  False  935  False  False  False  0 1 8 9 11 13 19 935  8  10  0 1 2 3 5 7 8 9 10 11 13 16 17 18 19 935  906  0  False  675  0  False  False  0 5 11  False  0  False  False  0  False  0  False  False  False  1 2 3 5 10 11 14 16 18  False  9  1 2 3 4 5 10 11 12 13 14 15 16 18 19  False  False  165  False  165  165  False  1  0  False  False  False  0  7  False  False  False  False  False  5 12  4  False  False  False  680  False  False  1  1  False  False  False  2  2  False  8  False  False  1  2  False  False  1  False  False  False  16  16  296  False  False  False  6  False  0 1 4 7 9 18  False  12  12  False  False  1 4 5 11 13 15 16  False  148  False  0  0  False  False  1  0  521  False  False  False  False  1  False  603  0  False  3  False  False  6 7 13 15 18 19  6 7 13 15 18 19  6 7 13 15 18 19  6 7 13 15 18 19  1  560  1  False  1  1  7  1 5 7 16 17 19 637  1 4 5 7 8 14 16 17 19 637  12  False  0 1 4 5 7 8 14 16 17 18 19 637  5  5  False  False  False  8  1 6 8 11 15 17 19 304  1 4 12 17  7  2  3 15  7  0  0  0 2 6 12 16  False  False  False  6  False  666  1  288  1  False  False  0  0  False  1 13  False  False  0  1  1  False  False  False  False  False  False  0  False  False  False  False  6 11  False  False  False  1 13 17 18 19  False  False  False  False  4 8 11 14 17 778  1  False  1  False  0  False  False  False  0 5 6 11 14 17 18 19  8  0 5 6 11 14 17 18 19  False  8  0 5 6 11 14 17 18 19 33 896  False  0  False  False  0  408  False  False  18  False  False  False  False  False  5  False  False  False  False  False  473 615 916  473 615 916  False  591  False  False  0  0  False |
| Задача 10. Обединение и сечение на множества | |
| **Условие**  Дадени са три редици от числа, дефинирани чрез формулите:   * f1(0) = 1; f1(k) = 2\*f1(k-1) + 3; f1 = {1, 5, 13, 29, …} * f2(0) = 2; f2(k) = 3\*f2(k-1) + 1; f2 = {2, 7, 22, 67, …} * f3(0) = 2; f3(k) = 2\*f3(k-1) - 1; f3 = {2, 3, 5, 9, …}   Напишете програма, която намира и извежда на конзолата сечението и обединението на множе­ствата от членовете на редиците в интервала [0; n], където n е в интервала между 0 и 100000: f1 \* f2; f1 \* f3; f2 \* f3; f1 \* f2 \* f3; f1 + f2; f1 + f3; f2 + f3; f1 + f2 + f3. Със символите + и \* означаваме съответно обединение и сечение на множества. | |
| **Описание на входа**  На един единствен ред се въвежда числото n, като n е в интервала между 0 и 100000. | |
| **Описание на изхода**  На отделни редове се извеждат елементите на различните сечения и обединения, разделени с интервал. Ако съответното сечение или обединение е празно, нищо не се печата. | |
| **Анализ на задачата**  Намерете всички членове на трите редици в посочения интервал и след това, използвайки **HashSet<int>,** реализирайте обединение и сечение на множества, след което направете исканите пресмятания. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Text;  class SetsUnionAndIntersection  {  static void Main(string[] args)  {  string inputLine = Console.ReadLine();  int n = int.Parse(inputLine);  HashSet<int> set1 = FillSet1(n);  HashSet<int> set2 = FillSet2(n);  HashSet<int> set3 = FillSet3(n);  HashSet<int> intersection12 = IntersectSets(set1, set2);  PrintSet(intersection12);  HashSet<int> intersection13 = IntersectSets(set1, set3);  PrintSet(intersection13);  HashSet<int> intersection23 = IntersectSets(set2, set3);  PrintSet(intersection23);  HashSet<int> intersection123 = IntersectSets(set1, intersection23);  PrintSet(intersection123);  HashSet<int> union12 = UnionSets(set1, set2);  PrintSet(union12);  HashSet<int> union13 = UnionSets(set1, set3);  PrintSet(union13);  HashSet<int> union23 = UnionSets(set2, set3);  PrintSet(union23);  HashSet<int> union123 = UnionSets(set1, union23);  PrintSet(union123);  }  private static HashSet<int> UnionSets(HashSet<int> set1, HashSet<int> set2)  {  HashSet<int> union = new HashSet<int>();  foreach (int element in set1)  {  union.Add(element);  }  union.UnionWith(set2);  return union;  }  private static HashSet<int> IntersectSets(HashSet<int> set1, HashSet<int> set2)  {  HashSet<int> intersection = new HashSet<int>();  foreach (int element in set1)  {  intersection.Add(element);  }  intersection.IntersectWith(set2);  return intersection;  }    private static void PrintSet(HashSet<int> set)  {  StringBuilder buffer = new StringBuilder();  foreach (int element in set)  {  buffer.AppendFormat("{0} ", element);  }  if (buffer.Length != 0)  {  Console.WriteLine(buffer.ToString());  }  }  private static HashSet<int> FillSet1(int n)  {  HashSet<int> set = new HashSet<int>();  int currentElement = 1;  while (currentElement <= n)  {  set.Add(currentElement);  currentElement = 2 \* currentElement + 3;  }  return set;  }  private static HashSet<int> FillSet2(int n)  {  HashSet<int> set = new HashSet<int>();  int currentElement = 2;  while (currentElement <= n)  {  set.Add(currentElement);  currentElement = 3 \* currentElement + 1;  }  return set;  }  private static HashSet<int> FillSet3(int n)  {  HashSet<int> set = new HashSet<int>();  int currentElement = 2;  while (currentElement <= n)  {  set.Add(currentElement);  currentElement = 2 \* currentElement - 1;  }  return set;  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 100000 * 0 | |
| **Вход** | **Изход** |
| 100000 | 5  2  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 3 9 17 33 65 12  9 257 513 1025 2049 4097 8193 16385 32769 65537  2 7 22 67 202 607 1822 5467 16402 49207 3 5 9 17 33 65 129 257 513 1025 2049 409  7 8193 16385 32769 65537  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207 3 9 17 33 65 129 257 513 1025 2049 4097 8193 16385 32769  65537 |
| **Вход** | **Изход** |
| 2 | 2  1 2  1 2  2  1 2 |
| **Вход** | **Изход** |
| 5 | 5  2  1 5 2  1 5 2 3  2 3 5  1 5 2 3 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 1 | 1  1  1 |
| **Вход** | **Изход** |
| 99999 | 5  2  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 3 9 17 33 65 12  9 257 513 1025 2049 4097 8193 16385 32769 65537  2 7 22 67 202 607 1822 5467 16402 49207 3 5 9 17 33 65 129 257 513 1025 2049 409  7 8193 16385 32769 65537  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207 3 9 17 33 65 129 257 513 1025 2049 4097 8193 16385 32769  65537 |
| **Вход** | **Изход** |
| 99990 | 5  2  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 3 9 17 33 65 12  9 257 513 1025 2049 4097 8193 16385 32769 65537  2 7 22 67 202 607 1822 5467 16402 49207 3 5 9 17 33 65 129 257 513 1025 2049 409  7 8193 16385 32769 65537  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 65533 2 7 22 67 202 607  1822 5467 16402 49207 3 9 17 33 65 129 257 513 1025 2049 4097 8193 16385 32769  65537 |
| **Вход** | **Изход** |
| 999 | 5  2  1 5 13 29 61 125 253 509 2 7 22 67 202 607  1 5 13 29 61 125 253 509 2 3 9 17 33 65 129 257 513  2 7 22 67 202 607 3 5 9 17 33 65 129 257 513  1 5 13 29 61 125 253 509 2 7 22 67 202 607 3 9 17 33 65 129 257 513 |
| **Вход** | **Изход** |
| 99 | 5  2  1 5 13 29 61 2 7 22 67  1 5 13 29 61 2 3 9 17 33 65  2 7 22 67 3 5 9 17 33 65  1 5 13 29 61 2 7 22 67 3 9 17 33 65 |
| **Вход** | **Изход** |
| 9 | 5  2  1 5 2 7  1 5 2 3 9  2 7 3 5 9  1 5 2 7 3 9 |
| **Вход** | **Изход** |
| 50000 | 5  2  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 7 22 67 202 607 1822  5467 16402 49207  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 3 9 17 33 65 129 257  513 1025 2049 4097 8193 16385 32769  2 7 22 67 202 607 1822 5467 16402 49207 3 5 9 17 33 65 129 257 513 1025 2049 409  7 8193 16385 32769  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 7 22 67 202 607 1822  5467 16402 49207 3 9 17 33 65 129 257 513 1025 2049 4097 8193 16385 32769 |
| **Вход** | **Изход** |
| 50001 | 5  2  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 7 22 67 202 607 1822  5467 16402 49207  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 3 9 17 33 65 129 257  513 1025 2049 4097 8193 16385 32769  2 7 22 67 202 607 1822 5467 16402 49207 3 5 9 17 33 65 129 257 513 1025 2049 409  7 8193 16385 32769  1 5 13 29 61 125 253 509 1021 2045 4093 8189 16381 32765 2 7 22 67 202 607 1822  5467 16402 49207 3 9 17 33 65 129 257 513 1025 2049 4097 8193 16385 32769 |
| Задача 11. Реализация на TreeMultiSet | |
| **Условие**  \* Дефинирайте клас TreeMultiSet<T>, който позволява да пазим съвкупност от елементи, подредени по големина и позволява повто­рения на някои от елементите. Реализирайте операциите добавяне на елемент, търсене на броя срещания на даден елемент, изтриване на елемент, итератор, намиране на най-малък / най-голям елемент, изтриване на най-малък / най-голям елемент. Реализирайте възможност за подаване на външен Comparer<T> за сравнение на елементите.  add m –добавя числото m в множеството.  countof m – изписва на екрана съобщение "c", където c е броят елементи в множеството, които имат стойност m.  smallest – извежда на екрана най-малкия елемент на множеството.  largest – извежда на екрана най-големия елемент на множеството.  remove m – ако множеството съдържаm, то m се изтрива от него. В противен случай на екрана се изписва съобщение "False".  remove\_smallest – изтрива най-малкият елемент на множеството, ако има такъв. Ако няма, изписва на конзолата "False".  remove\_largest – изтрива най-малкият елемент на множеството, ако има такъв. Ако няма, изписва на конзолата "False".  elements – извежда всички елементи на множеството, разделени с интервал.  Пример:  19  add 14  add 14  add 15  add 14  add 14  add 16  add 1  add 14  add 15  countof 14  elements  remove 3  add 14  largest  remove\_largest  remove 12  smallest  remove\_smallest  elements  Резултат:  5  1 14 15 16  False  16  False  1  14 15 | |
| **Описание на входа**  На първия ред се въвежда броят команди n, като n е между 0 и 1000. На следващите n реда се въвеждат команди. Командите са винаги в правилен формат, така че няма нужда да проверявате за коректен вход. | |
| **Описание на изхода**  Изходът се състои от един или няколко реда, съдържащи резултатите от командите, които го изискват. | |
| **Анализ на задачата**  Класът **TreeMultiSet<T>** можете да реализирате чрез **SortedDictionary<K, int>**, който пази броя срещания на всеки от ключовете. Намирането и премахването на най-големия и най-малкия елемент може да реализирате като връщате съответно последния и първия елемент на множеството. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  using System.Text;  class TreeMultiSet<T> : IEnumerable<KeyValuePair<T, int>>  {  private SortedDictionary<T, int> container;  public int Count  {  get  {  int count = container.Count;  return count;  }  }  public TreeMultiSet()  {  this.container = new SortedDictionary<T, int>();  }  public TreeMultiSet(Comparer<T> comparer)  {  this.container = new SortedDictionary<T, int>(comparer);  }  public void Add(T element)  {  int count;  bool containsElement = this.container.TryGetValue(element, out count);  if (containsElement)  {  count++;  }  else  {  count = 1;  }  this.container[element] = count;  }  public int CountOf(T element)  {  int count;  bool containsElement = this.container.TryGetValue(element, out count);  if (!containsElement)  {  count = 0;  }  return count;  }  public bool Remove(T element)  {  bool result = this.container.Remove(element);  return result;  }  public T SmallestElement()  {  var keys = this.container.Keys;  T result = default(T);  foreach (var item in keys)  {  result = item;  break;  }  return result;  }  public T LargestElement()  {  var keys = this.container.Keys;  T result = default(T);  foreach (var item in keys)  {  result = item;  }  return result;  }  public bool RemoveSmallestElement()  {  T elementToRemove = this.SmallestElement();  bool result = this.container.Remove(elementToRemove);  return result;  }  public bool RemoveLargestElement()  {  T elementToRemove = this.LargestElement();  bool result = this.container.Remove(elementToRemove);  return result;  }  IEnumerator<KeyValuePair<T, int>> IEnumerable<KeyValuePair<T, int>>.GetEnumerator()  {  foreach (KeyValuePair<T, int> entry in this.container)  {  yield return entry;  }  }  IEnumerator IEnumerable.GetEnumerator()  {  return ((IEnumerable<KeyValuePair<T, int>>)this).GetEnumerator();  }  }  class CommandExecuter  {  static StringBuilder output = new StringBuilder();  public static void Main(string[] args)  {  TreeMultiSet<int> set = new TreeMultiSet<int>();  ExecuteCommands(set);  Console.WriteLine(output.ToString().Trim());  }  private static void ExecuteCommands(TreeMultiSet<int> set)  {  string commandsCountInput = Console.ReadLine();  int commandsCount = int.Parse(commandsCountInput);  for (int i = 0; i < commandsCount; i++)  {  string command = Console.ReadLine();  ExecuteCommands(command, set);  }  }  private static void ExecuteCommands(string command, TreeMultiSet<int> set)  {  string[] tokens = command.Split(' ');  string commandAction = tokens[0];  switch (commandAction)  {  case "add":  ExecuteAddCommand(tokens, set);  break;  case "countof":  ExecuteCountOfCommand(tokens, set);  break;  case "remove":  ExecuteRemoveCommand(tokens, set);  break;  case "smallest":  ExecuteSmallestCommand(set);  break;  case "largest":  ExecuteLargestCommand(set);  break;  case "remove\_smallest":  ExecuteRemoveSmallestCommand(set);  break;  case "remove\_largest":  ExecuteRemoveLargestCommand(set);  break;  case "elements":  ExecuteElementsCommand(set);  break;  default:  break;  }  }  private static void PrintLine(string line)  {  if (line.Equals(String.Empty))  {  return;  }  output.AppendLine(line);  }  private static void ExecuteAddCommand(string[] tokens, TreeMultiSet<int> set)  {  int newElement = int.Parse(tokens[1]);  set.Add(newElement);  }  private static void ExecuteCountOfCommand(string[] tokens, TreeMultiSet<int> set)  {  int element = int.Parse(tokens[1]);  int count = set.CountOf(element);  PrintLine(count.ToString());  }  private static void ExecuteRemoveCommand(string[] tokens, TreeMultiSet<int> set)  {  int element = int.Parse(tokens[1]);  bool isRemoved = set.Remove(element);  if (!isRemoved)  {  PrintLine(isRemoved.ToString());  }  }  private static void ExecuteElementsCommand(TreeMultiSet<int> set)  {  StringBuilder buffer = new StringBuilder();  foreach (var item in set)  {  buffer.AppendFormat("{0} ", item.Key);  }  PrintLine(buffer.ToString());  }  private static void ExecuteSmallestCommand(TreeMultiSet<int> set)  {  int smallestElement = set.SmallestElement();  PrintLine(smallestElement.ToString());  }  private static void ExecuteLargestCommand(TreeMultiSet<int> set)  {  int largestElement = set.LargestElement();  PrintLine(largestElement.ToString());  }  private static void ExecuteRemoveSmallestCommand(TreeMultiSet<int> set)  {  bool isRemovalSuccessful = set.RemoveSmallestElement();  if (!isRemovalSuccessful)  {  PrintLine(isRemovalSuccessful.ToString());  }  }  private static void ExecuteRemoveLargestCommand(TreeMultiSet<int> set)  {  bool isRemovalSuccessful = set.RemoveLargestElement();  if (!isRemovalSuccessful)  {  PrintLine(isRemovalSuccessful.ToString());  }  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 команди * Голям брой добавяния на едни и същи числа * 1000 команди | |
| **Вход** | **Изход** |
| 19  add 14  add 14  add 15  add 14  add 14  add 16  add 1  add 14  add 15  countof 14  elements  remove 3  add 14  largest  remove\_largest  remove 12  smallest  remove\_smallest  elements | 5  1 14 15 16  False  16  False  1  14 15 |
| **Вход** | **Изход** |
| 0 | (празен низ) |
| **Вход** | **Изход** |
| 185  largest  countof 4  add 51  remove\_smallest  remove\_smallest  elements  add 36  elements  largest  countof 40  add 69  smallest  remove\_largest  add 49  countof 44  remove\_smallest  remove\_smallest  remove\_largest  remove 48  smallest  countof 78  smallest  remove\_largest  countof 62  smallest  add 38  countof 62  smallest  remove 47  remove 63  remove\_largest  remove\_largest  remove\_smallest  remove\_smallest  largest  remove\_largest  smallest  add 88  elements  remove\_smallest  add 57  remove 19  countof 17  countof 75  remove 87  countof 33  largest  elements  elements  remove 20  countof 62  countof 74  countof 1  elements  add 58  remove\_largest  remove\_largest  remove 36  smallest  remove\_largest  countof 0  smallest  smallest  add 98  smallest  remove 16  remove\_smallest  add 75  largest  largest  add 81  largest  largest  countof 86  remove 84  elements  elements  largest  smallest  countof 66  smallest  remove 41  elements  smallest  smallest  add 58  smallest  largest  remove 21  remove\_largest  remove 98  add 8  remove 32  smallest  smallest  elements  remove 81  countof 57  largest  remove 12  smallest  elements  remove\_smallest  remove\_largest  remove\_smallest  remove\_largest  elements  remove 17  remove 20  smallest  largest  remove 9  remove 99  add 91  remove\_largest  remove\_largest  remove\_largest  remove 10  remove\_smallest  countof 46  add 59  remove\_smallest  remove\_largest  remove\_largest  remove\_largest  smallest  add 57  largest  smallest  add 48  add 71  elements  elements  add 9  elements  largest  countof 55  countof 52  remove\_smallest  largest  remove 62  remove\_smallest  largest  add 54  smallest  remove\_largest  remove\_smallest  smallest  smallest  smallest  remove\_smallest  add 32  largest  remove\_smallest  largest  elements  smallest  remove\_smallest  countof 94  remove 98  largest  countof 85  remove\_largest  add 57  remove 8  countof 20  smallest  elements  add 34  largest  add 26  elements  smallest  smallest  remove\_smallest  smallest  elements  remove 64  elements  largest  largest  remove 77  add 68  remove 54  smallest | 0  0  False  36  36  0  36  0  False  False  0  0  0  False  0  0  0  38  False  False  False  False  False  0  False  0  88  False  0  0  False  0  57  57  57  False  0  0  0  57  False  0  False  0  0  0  98  False  75  75  81  81  0  False  75 81  75 81  81  75  0  75  False  75 81  75  75  58  81  False  False  False  8  8  8 58 75  False  0  75  False  8  8 58 75  False  False  False  0  0  False  False  False  False  False  False  0  False  False  False  0  57  57  48 57 71  48 57 71  9 48 57 71  71  0  0  71  False  71  54  57  57  57  32  0  0  False  0  False  0  0  False  False  0  57  57  57  26 34 57  26  26  34  34 57  False  34 57  57  57  False  False  34 |
| **Вход** | **Изход** |
| 104  smallest  remove\_largest  remove\_smallest  largest  add 36  add 73  add 7  elements  remove 69  countof 31  add 87  remove\_smallest  add 13  elements  smallest  largest  add 0  remove\_largest  remove 37  countof 41  remove\_smallest  add 53  countof 9  remove\_largest  remove\_largest  largest  remove 61  remove\_largest  largest  remove\_smallest  remove 12  countof 21  remove\_largest  elements  elements  remove\_largest  remove 70  remove\_largest  countof 98  remove 58  largest  countof 7  remove\_smallest  largest  largest  smallest  elements  remove\_largest  smallest  countof 46  remove 25  smallest  smallest  remove 30  remove\_largest  countof 98  remove\_largest  largest  smallest  smallest  countof 60  remove 33  remove\_largest  add 10  largest  countof 9  add 53  countof 97  add 90  countof 40  remove\_largest  remove\_smallest  smallest  remove\_smallest  largest  remove\_largest  remove 41  remove\_largest  countof 4  largest  remove\_smallest  largest  remove\_smallest  countof 44  elements  add 59  add 39  add 88  countof 16  remove 88  countof 32  remove\_smallest  remove 79  smallest  remove\_largest  remove\_smallest  elements  largest  add 52  add 36  countof 87  largest  largest  smallest | 0  False  False  0  7 36 73  False  0  13 36 73 87  13  87  False  0  0  36  False  13  False  0  False  False  False  False  0  False  0  0  False  0  0  0  False  0  0  False  0  0  False  False  0  False  0  0  0  0  False  False  10  0  0  0  53  0  False  False  False  0  0  False  0  False  0  0  0  False  59  False  0  0  52  52  36 |
| **Вход** | **Изход** |
| 173  remove 17  smallest  remove\_largest  remove\_largest  remove\_smallest  elements  elements  remove\_smallest  add 43  add 98  smallest  remove\_smallest  countof 8  smallest  countof 10  elements  remove\_largest  countof 95  elements  remove\_smallest  elements  largest  largest  add 0  largest  smallest  smallest  remove\_smallest  remove\_largest  countof 55  countof 82  smallest  smallest  add 79  remove\_largest  add 29  largest  remove 23  remove\_smallest  remove\_largest  smallest  elements  remove\_largest  largest  elements  smallest  remove\_largest  countof 79  remove 37  largest  add 93  remove\_smallest  smallest  remove\_smallest  remove\_largest  elements  largest  countof 32  remove\_smallest  smallest  remove\_smallest  smallest  add 86  remove 39  remove 34  remove 19  add 45  remove\_smallest  countof 81  remove\_largest  remove\_smallest  add 2  add 12  smallest  remove\_largest  elements  smallest  remove\_largest  remove\_largest  smallest  remove 21  largest  add 27  smallest  elements  largest  remove 99  remove\_largest  smallest  add 2  remove 81  elements  countof 86  smallest  add 13  remove\_largest  countof 30  largest  remove 15  largest  countof 47  largest  largest  remove\_largest  add 11  largest  elements  countof 16  remove 19  largest  remove\_smallest  countof 62  add 9  countof 97  add 18  elements  remove 44  countof 37  remove 81  remove\_smallest  countof 73  add 8  largest  countof 82  countof 97  countof 19  elements  add 70  countof 82  remove\_smallest  countof 99  remove\_smallest  smallest  countof 93  largest  countof 28  remove\_smallest  countof 39  elements  remove\_smallest  remove 11  smallest  elements  largest  countof 41  countof 99  remove\_largest  elements  add 6  remove\_largest  add 15  countof 18  largest  largest  countof 37  countof 21  add 80  smallest  elements  countof 59  largest  remove\_largest  add 41  elements  remove\_largest  largest  remove\_smallest  largest  remove\_smallest  countof 97  add 88  largest  add 86 | False  0  False  False  False  False  43  0  98  0  98  0  False  0  0  0  0  0  False  0  0  0  0  29  False  False  0  False  0  0  False  0  False  0  0  False  False  0  0  False  0  False  0  False  False  False  0  False  2  2  2  False  0  False  0  27  27  27  False  0  False  2  0  2  0  2  False  2  0  2  2  11  11  0  False  11  0  0  9 18  False  0  False  0  18  0  0  0  8 18  0  0  70  0  70  0  0  False  False  0  0  0  0  False  0  15  15  0  0  15  15 80  0  80  15 41  15  0  False  0  88 |
| **Вход** | **Изход** |
| 146  largest  remove 4  remove 86  largest  largest  remove 59  largest  add 82  elements  smallest  largest  remove 54  remove\_largest  elements  smallest  elements  largest  countof 31  add 28  elements  remove 87  remove 94  remove\_smallest  smallest  remove 41  countof 25  remove 19  elements  remove 22  add 78  remove\_largest  remove\_smallest  largest  remove\_largest  remove 14  remove 61  smallest  largest  largest  add 16  remove\_smallest  countof 57  remove\_smallest  countof 46  remove 64  remove 43  remove\_smallest  elements  remove 6  countof 63  elements  add 70  largest  remove 46  smallest  remove\_smallest  countof 8  remove\_smallest  add 33  remove 87  remove\_largest  remove 6  largest  add 62  remove 9  remove\_largest  remove\_smallest  countof 55  countof 94  remove\_largest  elements  add 9  elements  smallest  smallest  remove\_largest  largest  remove\_largest  remove 78  elements  largest  countof 73  remove 31  elements  largest  elements  remove\_smallest  remove 53  countof 1  remove\_smallest  add 94  remove\_largest  countof 90  countof 74  remove 14  remove\_smallest  elements  remove 88  smallest  elements  remove\_largest  countof 26  remove 72  remove\_largest  elements  add 48  remove\_largest  largest  remove\_smallest  add 19  remove\_smallest  largest  elements  elements  remove\_largest  smallest  remove\_largest  remove\_smallest  largest  remove 57  countof 17  add 8  remove 96  add 9  elements  remove\_largest  add 27  remove\_largest  remove 79  add 92  remove 39  remove 52  remove\_smallest  countof 46  add 95  smallest  add 6  add 10  remove\_smallest  elements  remove\_smallest  largest  remove\_smallest  elements  elements  countof 84 | 0  False  False  0  0  False  0  82  82  82  False  0  0  0  28  False  False  0  False  0  False  False  False  0  False  False  False  0  0  0  0  False  0  False  False  False  False  0  70  False  70  0  False  False  False  0  False  False  0  0  False  9  9  9  0  False  False  0  0  False  0  False  False  0  False  0  0  False  False  False  0  False  0  False  False  0  False  0  False  0  False  False  0  False  0  False  8 9  False  False  False  0  92  10 92 95  95  95  95  0 |
| **Вход** | **Изход** |
| 538  elements  remove 2  add 9  add 49  elements  countof 88  largest  remove\_largest  remove 2  add 25  add 1  smallest  add 29  remove\_smallest  remove\_smallest  countof 82  remove\_largest  remove\_smallest  elements  smallest  smallest  remove\_largest  elements  elements  smallest  elements  remove\_smallest  largest  smallest  add 9  elements  remove\_largest  remove 68  elements  remove 55  largest  add 10  add 38  remove\_largest  remove\_smallest  remove\_largest  countof 58  elements  countof 30  smallest  largest  smallest  remove\_largest  add 58  elements  remove\_largest  add 39  remove\_smallest  remove\_smallest  elements  remove 15  smallest  smallest  elements  countof 47  countof 4  remove\_largest  smallest  smallest  smallest  countof 20  remove\_smallest  remove\_largest  add 74  countof 72  remove\_smallest  remove 37  largest  largest  smallest  smallest  remove\_smallest  largest  remove\_smallest  smallest  remove 40  largest  largest  remove 67  largest  remove\_smallest  remove\_smallest  add 37  remove\_smallest  add 28  remove\_smallest  smallest  remove\_smallest  countof 21  remove 89  smallest  remove 63  remove\_largest  add 93  remove 73  add 54  largest  countof 90  countof 1  largest  remove\_smallest  remove 15  smallest  add 51  remove\_smallest  remove 68  remove 24  elements  elements  remove\_largest  largest  remove 38  largest  elements  countof 89  remove\_smallest  countof 74  countof 0  remove\_smallest  largest  remove\_largest  largest  countof 14  remove\_smallest  remove\_largest  elements  remove\_largest  add 84  elements  elements  largest  remove 10  remove\_largest  remove\_smallest  smallest  remove\_smallest  countof 1  countof 75  remove 24  elements  remove\_smallest  elements  add 41  countof 99  remove\_largest  countof 42  countof 12  add 30  countof 78  remove\_smallest  remove 54  remove\_smallest  elements  largest  largest  remove\_smallest  smallest  add 80  remove 50  largest  remove\_smallest  remove\_largest  remove\_largest  elements  remove\_largest  add 4  remove\_smallest  remove\_smallest  largest  elements  countof 45  elements  elements  remove\_smallest  largest  add 56  smallest  remove 89  countof 62  remove 33  countof 32  remove\_smallest  remove 43  remove\_smallest  remove 63  remove\_smallest  remove 27  countof 54  add 73  elements  remove\_smallest  elements  remove\_largest  remove\_largest  add 63  remove\_smallest  remove\_largest  smallest  remove\_smallest  remove\_smallest  add 19  remove\_largest  largest  countof 64  smallest  elements  remove\_smallest  add 27  countof 15  remove\_largest  remove\_largest  countof 61  smallest  smallest  largest  smallest  remove\_smallest  remove 25  remove 83  smallest  remove 53  remove\_smallest  remove\_largest  elements  remove\_smallest  add 20  smallest  elements  remove\_largest  add 56  add 18  add 84  remove 76  remove\_smallest  add 26  smallest  add 41  add 12  countof 38  remove\_largest  largest  remove 38  countof 17  smallest  add 27  smallest  smallest  add 64  remove 27  remove\_largest  remove 82  smallest  remove 67  largest  elements  largest  countof 38  elements  add 60  smallest  remove\_largest  largest  remove\_largest  remove\_largest  largest  smallest  smallest  remove\_smallest  remove 94  remove\_largest  elements  largest  elements  remove 51  remove 89  countof 19  add 24  remove\_smallest  elements  remove\_smallest  remove 65  remove\_largest  countof 85  countof 29  smallest  remove\_largest  largest  remove\_largest  remove 82  remove\_largest  elements  smallest  remove\_smallest  largest  largest  smallest  remove\_smallest  elements  elements  countof 67  add 9  elements  smallest  remove 57  elements  remove\_largest  add 28  remove\_smallest  remove\_smallest  smallest  smallest  remove\_largest  largest  smallest  remove\_smallest  smallest  largest  countof 54  countof 26  remove\_largest  smallest  remove\_smallest  countof 45  elements  smallest  remove\_smallest  largest  largest  remove\_largest  add 36  add 50  elements  remove\_largest  smallest  remove\_smallest  smallest  countof 73  countof 3  remove\_largest  elements  remove 20  smallest  remove\_smallest  smallest  smallest  elements  remove\_smallest  largest  elements  remove\_largest  remove\_largest  smallest  countof 89  elements  add 94  remove\_smallest  remove\_smallest  countof 42  countof 46  remove\_smallest  remove\_largest  remove\_largest  remove\_smallest  add 6  countof 70  smallest  smallest  remove\_smallest  countof 28  elements  add 36  add 69  smallest  largest  countof 5  add 58  largest  countof 68  countof 40  add 84  remove\_largest  elements  elements  elements  remove\_smallest  remove\_smallest  remove 57  largest  remove\_smallest  countof 39  elements  smallest  remove\_smallest  remove\_smallest  add 87  remove 55  smallest  elements  largest  remove 61  remove\_smallest  countof 8  elements  smallest  elements  remove 32  largest  elements  countof 28  elements  remove 71  remove\_largest  add 87  elements  add 66  add 16  remove\_largest  smallest  largest  remove 14  largest  smallest  remove\_largest  remove 66  remove 94  smallest  countof 66  countof 66  remove\_largest  add 33  largest  smallest  smallest  add 50  largest  remove\_smallest  remove 11  remove\_smallest  remove 95  remove\_smallest  add 21  smallest  remove\_largest  remove\_smallest  countof 80  countof 4  remove\_largest  largest  largest  smallest  remove 58  smallest  remove\_smallest  remove 17  largest  remove\_smallest  remove\_smallest  remove 8  smallest  remove\_largest  largest  remove\_largest  add 71  remove\_smallest  remove 42  remove 34  add 25  smallest  add 68  remove 10  smallest  remove\_smallest  remove\_largest  largest  add 25  countof 88  smallest  smallest  countof 35  elements  smallest  remove\_largest  remove 31  remove\_largest  largest  add 16  remove 18  remove 17  countof 95  largest  countof 32  countof 48  remove 62  countof 72  remove 95  remove\_largest  remove 60  countof 30  remove 20  add 31  elements  countof 92  add 27  add 22  elements  countof 45  largest  remove 90  remove 59  remove\_smallest  add 18  remove\_smallest  add 31  remove 11  add 36  elements  countof 43  elements  add 92  add 11  remove\_largest  add 41  remove 26  elements  remove 11  remove\_smallest  elements  remove 77  largest  elements  add 1  smallest  countof 7 | False  9 49  0  49  False  1  0  0  0  False  0  False  0  0  9  False  False  0  False  0  0  0  0  0  False  58  False  False  0  0  0  0  False  0  0  0  0  False  False  0  False  0  0  0  0  False  0  False  0  False  0  0  False  0  False  False  0  False  0  False  0  False  False  False  93  0  0  93  False  93  False  False  93  93  0  False  0  0  False  0  0  False  0  False  0  0  False  False  False  84  84  84  False  False  0  False  0  0  False  False  0  0  0  0  False  False  0  0  False  0  False  80  False  False  False  False  0  0  False  0  56  False  0  False  0  False  False  False  False  False  0  73  False  False  False  0  False  False  0  0  0  False  0  False  0  0  0  0  0  False  False  False  0  False  False  False  False  20  20  False  26  0  56  False  0  12  12  12  False  12  False  56  12 26 41 56  56  0  12 26 41 56  12  56  26  12  12  False  0  False  False  0  False  False  False  0  0  0  False  0  False  False  False  0  False  0  0  0  False  0  9  9  False  9  False  0  0  False  0  0  False  0  0  0  0  False  0  False  0  0  False  0  0  False  36 50  36  0  0  0  False  False  0  False  0  0  False  0  False  False  0  0  False  0  0  False  False  False  False  0  6  6  0  36  69  0  69  0  0  36 58 69  36 58 69  36 58 69  False  69  0  0  False  False  False  87  87  87  False  0  0  False  0  0  False  False  87  16  66  False  66  16  False  False  16  0  0  33  33  33  50  False  False  False  21  False  0  0  False  0  0  0  False  0  False  False  0  False  False  False  0  False  0  False  False  False  25  False  25  0  0  25  25  0  25  25  False  False  0  False  False  0  16  0  0  False  0  False  False  0  False  31  0  22 27 31  0  31  False  False  False  27 31 36  0  27 31 36  False  11 27 31 36 41  31 36 41  False  41  31 36 41  1  0 |
| **Вход** | **Изход** |
| 812  remove\_smallest  countof 90  remove\_smallest  add 51  countof 74  remove\_largest  remove\_largest  remove\_smallest  countof 88  countof 87  remove 0  elements  remove\_smallest  remove\_smallest  elements  smallest  remove\_largest  remove\_smallest  remove\_smallest  countof 88  largest  smallest  remove\_smallest  add 72  countof 39  elements  countof 22  remove\_largest  remove\_smallest  remove\_smallest  add 14  remove\_smallest  add 41  smallest  countof 18  remove\_smallest  remove\_smallest  elements  add 35  smallest  countof 19  smallest  remove 1  remove\_largest  remove\_smallest  largest  remove 12  remove\_largest  elements  elements  smallest  countof 74  add 14  remove 91  remove\_smallest  remove\_largest  remove\_smallest  remove\_smallest  countof 28  add 69  elements  remove\_smallest  remove\_smallest  add 37  remove\_smallest  countof 79  remove\_smallest  elements  remove\_largest  remove\_largest  add 57  remove\_largest  largest  countof 46  smallest  remove\_smallest  add 92  remove\_smallest  remove\_largest  remove\_smallest  smallest  remove\_largest  remove 49  remove\_smallest  add 73  remove\_largest  elements  largest  largest  smallest  remove\_smallest  largest  countof 25  remove 4  countof 31  smallest  remove\_largest  add 96  add 50  remove\_smallest  remove\_largest  remove 67  add 10  elements  remove 93  elements  elements  remove 0  elements  add 1  countof 97  remove 22  largest  elements  countof 46  remove\_smallest  elements  largest  smallest  countof 60  remove\_largest  remove 41  countof 32  elements  largest  remove 59  smallest  smallest  remove 63  remove 31  add 4  remove 21  smallest  remove\_smallest  add 62  remove\_largest  elements  remove\_largest  largest  remove\_largest  add 12  largest  largest  countof 33  countof 59  elements  remove\_largest  largest  countof 48  elements  smallest  elements  remove\_largest  countof 25  elements  countof 58  remove\_largest  remove 22  remove\_largest  elements  remove\_smallest  remove\_smallest  largest  countof 46  remove 68  countof 46  remove\_largest  elements  countof 30  countof 72  countof 22  remove\_smallest  add 96  remove\_largest  remove\_smallest  remove\_smallest  add 74  largest  remove\_smallest  remove\_smallest  smallest  remove 33  remove 32  smallest  smallest  remove\_largest  remove 58  add 90  remove\_largest  remove\_smallest  elements  add 92  add 95  remove\_largest  smallest  smallest  largest  largest  countof 83  add 99  add 50  smallest  remove\_largest  largest  elements  remove\_largest  countof 48  largest  remove\_largest  elements  remove\_smallest  remove\_largest  remove\_largest  remove\_smallest  largest  add 16  countof 77  largest  countof 73  remove\_smallest  elements  remove 3  remove\_smallest  remove\_largest  add 49  remove 48  remove\_largest  remove\_largest  add 22  remove 80  remove\_largest  remove\_smallest  largest  remove 13  add 11  largest  largest  elements  elements  add 67  elements  countof 42  smallest  remove\_smallest  countof 65  remove\_smallest  remove\_largest  smallest  remove\_smallest  smallest  smallest  largest  countof 0  add 52  smallest  remove\_largest  remove 32  add 98  remove\_largest  largest  largest  remove\_largest  remove\_smallest  smallest  remove\_smallest  remove\_largest  add 82  remove 26  smallest  smallest  remove 1  remove\_smallest  add 5  remove 90  remove\_largest  remove\_largest  smallest  elements  largest  largest  smallest  largest  remove 30  remove\_smallest  countof 44  largest  countof 62  remove\_largest  add 29  remove\_smallest  elements  smallest  largest  countof 90  largest  largest  countof 36  add 28  remove 74  add 93  remove\_largest  add 88  countof 97  remove 26  remove\_smallest  largest  remove\_smallest  add 97  remove\_largest  countof 39  remove\_largest  add 76  largest  add 38  countof 24  add 97  elements  remove 20  countof 1  smallest  smallest  remove 65  remove 53  elements  elements  remove 43  largest  remove\_largest  add 56  remove\_largest  largest  remove\_smallest  elements  elements  remove 24  largest  countof 5  largest  remove\_smallest  remove\_largest  remove\_largest  countof 2  add 6  smallest  smallest  remove 61  largest  countof 92  remove\_largest  elements  countof 44  add 40  largest  countof 68  countof 35  countof 34  countof 93  remove\_largest  remove\_largest  countof 30  add 67  remove\_smallest  add 72  remove 40  largest  remove 53  remove 22  add 49  add 11  smallest  add 6  add 65  elements  smallest  countof 65  remove\_largest  remove\_largest  remove\_smallest  remove\_largest  largest  remove\_smallest  smallest  remove 29  add 24  countof 78  smallest  countof 70  remove\_largest  remove 63  smallest  elements  remove 73  remove 11  largest  remove\_smallest  remove\_largest  countof 65  countof 22  largest  smallest  elements  smallest  remove\_smallest  remove\_smallest  remove\_smallest  remove\_largest  remove\_largest  remove\_largest  remove\_smallest  smallest  remove\_largest  elements  largest  remove\_smallest  elements  smallest  remove\_largest  remove\_smallest  remove\_largest  remove\_smallest  remove\_smallest  smallest  add 36  remove\_smallest  add 4  remove\_smallest  countof 64  elements  add 66  remove 50  remove\_smallest  elements  countof 61  remove\_largest  largest  add 61  remove 55  countof 96  add 88  remove\_smallest  remove\_largest  largest  smallest  remove\_largest  remove\_largest  smallest  smallest  remove 1  remove\_smallest  remove\_largest  countof 62  add 42  remove\_largest  remove 25  countof 25  smallest  remove\_smallest  add 98  add 55  remove\_largest  remove\_smallest  remove\_largest  largest  add 2  remove\_largest  smallest  remove\_largest  smallest  largest  elements  largest  add 22  remove\_smallest  add 91  add 45  largest  largest  elements  remove\_largest  elements  remove\_smallest  remove\_largest  remove\_smallest  remove 18  smallest  smallest  remove\_smallest  countof 59  remove\_smallest  largest  smallest  remove\_smallest  remove\_smallest  smallest  countof 29  elements  countof 38  remove\_smallest  add 2  remove\_largest  largest  add 92  remove\_smallest  add 30  remove\_largest  elements  largest  remove 17  add 16  largest  elements  countof 24  remove 46  smallest  add 62  remove 32  add 37  remove 95  remove\_smallest  largest  add 75  largest  largest  remove\_smallest  smallest  largest  elements  countof 28  elements  largest  remove\_largest  remove 56  remove 96  remove\_smallest  add 97  countof 33  remove\_smallest  largest  remove\_smallest  elements  remove\_largest  largest  remove\_smallest  remove\_smallest  add 82  remove 10  remove 41  largest  largest  elements  largest  remove\_smallest  remove 19  countof 54  largest  remove\_largest  elements  remove\_largest  remove\_largest  smallest  largest  elements  remove\_smallest  remove 67  add 7  remove\_largest  remove\_smallest  largest  elements  remove 47  countof 12  countof 75  elements  countof 77  remove 72  smallest  remove 87  countof 44  elements  countof 16  remove\_largest  remove\_largest  elements  remove 50  elements  remove\_smallest  remove\_smallest  remove\_smallest  remove 43  remove\_smallest  remove 98  remove\_largest  elements  remove\_smallest  elements  smallest  remove 1  add 61  elements  add 82  smallest  remove 49  largest  remove\_smallest  add 72  largest  remove\_smallest  add 46  countof 72  countof 52  add 29  remove\_largest  remove 61  smallest  largest  largest  elements  smallest  smallest  largest  remove\_largest  countof 81  countof 89  countof 67  smallest  remove 24  countof 62  remove 1  remove\_smallest  remove 67  smallest  largest  countof 18  remove\_largest  elements  remove\_smallest  remove\_largest  remove\_smallest  smallest  remove 92  remove\_largest  largest  countof 18  largest  elements  smallest  elements  elements  largest  elements  add 75  countof 77  countof 22  elements  largest  remove\_smallest  countof 87  smallest  elements  remove 38  elements  countof 8  smallest  remove 80  remove 54  smallest  remove\_smallest  add 43  remove\_largest  add 35  remove 79  elements  largest  countof 43  largest  countof 57  largest  remove\_smallest  remove\_largest  remove\_smallest  remove\_smallest  elements  add 24  elements  countof 94  countof 82  smallest  remove 15  remove\_smallest  countof 72  add 16  remove\_largest  countof 51  remove 89  add 58  remove 5  elements  smallest  elements  largest  elements  largest  elements  remove\_smallest  remove\_largest  largest  remove\_smallest  remove\_largest  largest  remove\_smallest  countof 13  largest  remove 59  smallest  smallest  countof 87  countof 40  remove\_smallest  largest  remove 28  remove\_largest  remove\_largest  smallest  elements  remove\_largest  countof 56  remove 31  largest  remove\_smallest  countof 9  remove 17  smallest  smallest  remove 46  remove 23  remove 71  elements  elements  largest  remove\_smallest  largest  remove\_largest  add 16  add 66  remove 6  remove\_smallest  countof 80  remove\_smallest  smallest  largest  remove\_largest  countof 84  remove\_largest  countof 34  remove\_largest  remove\_smallest  remove\_largest  elements  smallest  add 94  add 43  countof 46  add 25  smallest  add 52  countof 35  remove\_smallest  largest  remove\_smallest  remove 48  countof 60  remove\_smallest  elements  remove\_largest  smallest  countof 87  countof 63  remove 86  remove\_largest  elements  add 70  add 71  remove 63  largest  remove\_smallest  remove\_smallest  smallest  add 52  remove 0  smallest  countof 72  largest  largest  countof 58  smallest  remove\_largest  add 15  remove\_smallest  remove 25  remove 43  elements  largest  countof 52  add 65  largest  remove\_largest  smallest  remove\_smallest  elements  smallest  elements  remove 93 | False  0  False  0  False  False  0  0  False  False  False  0  False  False  False  0  0  0  False  0  72  0  False  False  41  0  False  35  0  35  False  False  0  False  False  0  0  False  False  False  False  0  69  False  0  False  False  False  0  0  0  False  False  False  0  False  False  False  0  0  0  False  0  0  False  0  0  False  False  10  False  10  10  False  10  0  False  10  1 10  0  10  10  10  0  False  0  0  False  0  0  False  False  False  4  False  0  False  12  12  0  0  12  0  0  0  False  0  0  False  False  False  False  False  0  0  False  0  False  0  0  0  False  False  False  74  False  0  False  False  0  0  False  False  False  92  92  92  92  0  50  92  50 92  0  50  False  False  False  False  0  0  16  0  False  False  False  False  False  False  False  0  False  11  11  11  11  11 67  0  11  0  False  0  False  0  0  0  0  52  False  0  0  False  False  0  False  False  False  82  82  False  False  False  0  0  0  0  0  False  False  0  0  0  False  0  0  0  0  0  0  False  0  False  88  0  False  76  0  38 76 97  False  0  38  38  False  False  38 76 97  38 76 97  False  97  56  56  56  False  56  0  56  False  False  0  6  6  False  6  0  0  40  0  0  0  0  False  0  False  72  False  False  11  6 11 49 65 72  6  1  11  0  False  0  24  0  False  0  False  False  0  False  False  0  0  0  0  0  False  False  False  False  False  False  False  0  False  0  False  0  False  False  False  False  False  0  0  False  0  False  0  False  0  0  0  False  False  0  0  False  False  False  0  False  0  0  False  False  0  0  False  0  0  0  91  91  45 91  45  False  False  False  0  0  False  0  False  0  0  False  False  0  0  0  False  0  0  False  16  16  0  False  16  False  False  62  75  75  62  75  62 75  0  62 75  75  False  False  0  0  False  False  0  False  False  False  False  82  82  82  82  False  0  0  False  False  False  0  0  False  False  False  0  False  0  0  0  False  0  False  0  0  False  False  False  False  False  False  False  False  False  False  False  0  False  61  61  False  82  82  0  0  False  29  46  46  29 46  29  29  46  0  0  0  29  False  0  False  False  0  0  0  False  False  False  False  0  False  False  0  0  0  0  0  0  0  75  75  0  0  False  0  0  False  False  0  False  False  35  35  0  35  0  35  False  False  False  24  0  0  24  False  0  0  False  False  58  58  58  58  58  58  58  False  0  False  False  0  False  0  0  False  0  0  0  0  False  0  False  False  False  0  False  0  False  0  False  0  False  0  0  False  False  False  0  False  0  False  False  0  0  0  False  0  False  0  False  False  False  0  0  25  0  94  False  0  94  0  0  0  False  False  False  71  0  False  52  0  52  52  0  52  False  False  0  0  65  0  False  0  False |
| **Вход** | **Изход** |
| 951  add 14  add 83  add 27  add 12  add 58  add 41  add 76  add 18  add 73  add 67  add 92  add 71  add 89  add 48  add 96  add 32  add 85  add 81  add 40  add 27  add 41  add 29  add 57  add 55  add 55  add 63  add 85  add 10  add 60  add 43  add 80  add 21  add 95  add 42  add 57  add 99  add 29  add 35  add 85  add 95  add 54  add 91  add 15  add 54  add 56  add 62  add 64  add 12  add 18  add 97  add 19  add 62  add 11  add 99  add 63  add 23  add 45  add 73  add 73  add 83  add 57  add 73  add 43  add 20  add 82  add 64  add 81  add 38  add 76  add 93  add 14  add 43  add 69  add 63  add 36  add 12  add 55  add 98  add 61  add 26  add 77  add 26  add 73  add 10  add 67  add 75  add 32  add 87  add 12  add 16  add 46  add 93  add 58  add 10  add 51  add 68  add 25  add 49  add 37  add 54  add 79  add 12  add 85  add 69  add 27  add 70  add 80  add 63  add 87  add 55  add 66  add 54  add 85  add 26  add 27  add 74  add 10  add 82  add 49  add 47  add 13  add 57  add 94  add 18  add 39  add 47  add 84  add 45  add 24  add 96  add 53  add 72  add 31  add 14  add 81  add 87  add 56  add 97  add 76  add 17  add 77  add 99  add 26  add 88  add 68  add 64  add 23  add 44  add 48  add 33  add 58  add 79  add 35  add 86  add 56  add 78  add 92  add 30  add 40  add 48  add 19  add 18  add 30  add 62  add 33  add 17  add 75  add 73  add 86  add 78  add 54  add 10  add 59  add 56  add 27  add 41  add 55  add 88  add 32  add 33  add 17  add 94  add 81  add 49  add 10  add 10  add 89  add 46  add 57  add 94  add 92  add 90  add 93  add 38  add 30  add 24  add 32  add 47  add 76  add 97  add 99  add 48  add 56  add 90  add 95  add 52  add 40  add 95  add 87  add 37  add 66  add 62  add 70  add 61  add 54  add 72  add 42  add 81  add 74  add 29  add 47  add 47  add 30  add 30  add 96  add 88  add 51  add 98  add 19  add 73  add 95  add 19  add 77  add 60  add 70  add 29  add 98  add 16  add 68  add 16  add 28  add 12  add 82  add 37  add 41  add 19  add 82  add 50  add 65  add 13  add 71  add 20  add 34  add 58  add 46  add 34  add 15  add 88  add 89  add 52  add 45  add 69  add 65  add 58  add 51  add 35  add 78  add 77  add 70  add 76  add 65  add 53  add 62  add 58  add 33  add 66  add 70  add 21  add 59  add 65  add 98  add 18  add 80  add 59  add 56  add 53  add 42  add 97  add 26  add 29  add 17  add 63  add 94  add 85  add 47  add 49  add 25  add 36  add 70  add 54  add 31  add 11  add 83  add 25  add 53  add 83  add 18  add 60  add 18  add 91  add 93  add 18  add 49  add 93  add 90  add 96  add 90  add 61  add 98  add 41  add 63  add 83  add 93  add 34  add 56  add 84  add 76  add 90  add 93  add 93  add 64  add 62  add 57  add 33  add 29  add 10  add 62  add 48  add 48  add 86  add 86  add 77  add 29  add 82  add 55  add 22  add 36  add 82  add 79  add 46  add 11  add 24  add 37  add 24  add 14  add 60  add 45  add 85  add 23  add 30  add 52  add 27  add 43  add 62  add 72  add 80  add 79  add 22  add 44  add 34  add 14  add 43  add 11  add 41  add 83  add 59  add 23  add 25  add 43  add 68  add 43  add 59  add 59  add 98  add 66  add 70  add 75  add 32  add 52  add 65  add 92  add 19  add 25  add 91  add 12  add 91  add 17  add 89  add 11  add 65  add 45  add 89  add 16  add 13  add 85  add 73  add 90  add 22  add 21  add 23  add 65  add 24  add 69  add 39  add 18  add 90  add 46  add 62  add 25  add 89  add 97  add 85  add 32  add 97  add 17  add 71  add 90  add 90  add 99  add 63  add 83  add 17  add 43  add 94  add 16  add 21  add 74  add 60  add 51  add 47  add 85  add 47  add 78  add 57  add 30  add 78  add 33  add 29  add 68  add 44  add 65  add 41  add 50  add 73  add 57  add 66  add 82  add 48  add 20  add 67  add 78  add 59  add 66  add 10  add 91  add 31  add 12  add 53  add 58  add 16  add 79  add 81  add 87  add 23  add 27  add 39  add 82  add 28  add 67  add 17  add 46  add 87  add 79  add 59  add 11  add 43  add 55  add 21  add 84  add 74  add 11  add 91  add 81  add 29  add 31  add 10  add 67  add 94  add 89  add 51  add 66  add 77  add 92  add 61  add 41  add 25  add 15  add 32  add 73  add 63  add 46  add 21  add 79  add 77  add 41  add 20  add 88  add 83  add 54  add 72  add 62  add 27  add 38  add 73  add 58  add 50  add 82  add 86  add 69  add 66  add 26  add 24  add 17  add 49  add 83  add 69  add 60  add 12  add 82  add 28  add 91  add 25  add 56  add 66  add 64  add 61  add 88  add 70  add 58  add 95  add 33  add 27  add 21  add 16  add 84  add 82  add 11  add 46  add 73  add 88  add 21  add 99  add 50  add 40  add 15  add 24  add 23  add 83  add 59  add 49  add 47  add 27  add 45  add 32  add 97  add 11  add 93  add 50  add 19  add 15  add 91  add 10  add 99  add 47  add 76  add 91  add 23  add 25  add 29  add 30  add 22  add 29  add 36  add 16  add 27  add 73  add 62  add 42  add 60  add 52  add 62  add 62  add 39  add 82  add 25  add 66  add 41  add 63  add 69  add 29  add 75  add 26  add 89  add 52  add 31  add 10  add 15  add 88  add 48  add 55  add 46  add 66  add 40  add 65  add 19  add 89  add 51  add 86  add 72  add 55  add 54  add 18  add 88  add 55  add 76  add 51  add 69  add 44  add 99  add 48  add 37  add 39  add 78  add 16  add 80  add 61  add 39  add 86  add 68  add 49  add 67  add 30  add 11  add 76  add 37  add 96  add 45  add 17  add 12  add 80  add 11  add 93  add 79  add 55  add 13  add 39  add 49  add 19  add 33  add 77  add 88  add 17  add 94  add 29  add 12  add 12  add 37  add 31  add 98  add 10  add 58  add 58  add 58  add 44  add 69  add 75  add 61  add 44  add 14  add 90  add 67  add 56  add 37  add 64  add 95  add 48  add 59  add 25  add 96  add 44  add 42  add 91  add 20  add 77  add 81  add 51  add 55  add 57  add 70  add 70  add 49  add 34  add 33  add 92  add 91  add 60  add 66  add 69  add 12  add 16  add 32  add 52  add 21  add 42  add 15  add 11  add 49  add 50  add 75  add 17  add 67  add 39  add 24  add 41  add 39  add 61  add 34  add 35  add 69  add 94  add 54  add 93  add 71  add 55  add 59  add 91  add 18  add 19  add 13  add 16  add 19  add 31  add 99  add 39  add 61  add 60  add 90  add 77  add 86  add 46  add 11  add 96  add 98  add 46  add 83  add 12  add 97  add 73  add 21  add 41  add 66  add 28  add 88  add 37  add 16  add 66  add 96  add 62  add 91  add 27  add 20  add 72  add 42  add 75  add 61  add 23  add 67  add 61  add 42  add 11  add 16  add 44  add 25  add 38  add 78  add 75  add 59  add 14  add 36  add 82  add 53  add 32  add 71  add 47  add 36  add 25  add 40  add 58  add 53  add 62  add 96  add 81  add 44  add 59  add 27  add 75  add 99  add 35  add 39  add 37  add 60  add 81  add 99  add 49  add 27  add 34  add 87  add 66  add 95  add 60  add 97  add 57  add 84  add 20  add 22  add 29  add 46  add 83  add 85  add 46  add 95  add 73  add 59  add 15  add 80  add 43  add 89  add 70  add 16  add 44  add 56  add 98  add 36  add 26  add 64  add 12  add 50  add 42  add 82  add 94  add 27  add 22  add 85  add 24  add 34  add 36  add 28  add 32  add 50  add 45  add 96  add 96  add 46  add 12  add 68  add 32  add 44  add 60  add 43  add 23  add 15  add 68  add 97  add 24  add 59  add 18  add 50  add 75  add 63  add 38  add 73  add 76  add 56  add 22  add 18  add 15  add 60  add 32  add 54  add 59  add 86  add 57  add 12  add 80  add 97  add 43  add 95  add 86  add 14  add 39  add 43  add 73  add 87  add 58  add 42  add 60  add 16  add 98  add 59  add 21  add 35  add 58  add 92  add 31  add 98  add 21  add 81  add 57  add 57  add 87  add 65  add 45  add 94  add 71  add 40  add 49  add 42  add 65  add 20  add 41  add 69  add 67  add 48  add 71  add 89  add 95  add 23  add 77  add 97  add 68  elements | 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 |
| **Вход** | **Изход** |
| 1000  remove 7  countof 96  smallest  remove 68  remove 87  remove 44  elements  largest  add 91  remove 78  remove\_smallest  largest  add 96  smallest  remove\_smallest  smallest  remove 91  countof 80  remove\_largest  remove 96  remove 22  smallest  remove\_smallest  elements  remove\_largest  largest  remove\_largest  remove\_smallest  remove\_smallest  countof 61  countof 92  remove\_largest  largest  remove\_smallest  elements  smallest  add 98  remove\_largest  remove\_largest  smallest  remove\_largest  smallest  remove\_smallest  remove\_smallest  largest  countof 88  largest  largest  remove 11  remove\_smallest  countof 32  elements  largest  remove 86  elements  remove 78  remove\_largest  largest  largest  smallest  smallest  smallest  remove\_largest  remove 21  elements  smallest  smallest  elements  remove\_largest  largest  countof 85  countof 53  remove\_largest  remove\_smallest  add 81  remove\_largest  countof 39  smallest  add 95  remove\_largest  add 96  largest  remove\_smallest  elements  remove\_largest  countof 21  countof 76  add 16  remove 35  remove\_smallest  remove 15  smallest  remove 38  smallest  remove\_smallest  remove 47  add 80  remove\_smallest  remove\_smallest  remove 99  add 80  smallest  smallest  remove\_largest  smallest  remove\_largest  remove 84  remove\_smallest  elements  remove\_smallest  add 77  remove\_largest  largest  remove\_smallest  smallest  countof 81  countof 88  remove\_smallest  largest  smallest  smallest  largest  add 53  countof 14  smallest  elements  countof 71  countof 75  elements  smallest  countof 47  remove\_largest  remove\_smallest  largest  smallest  remove\_largest  largest  largest  remove\_smallest  largest  add 26  largest  smallest  remove\_largest  countof 12  remove\_largest  add 38  elements  remove\_largest  remove\_largest  remove\_smallest  largest  largest  remove\_smallest  elements  add 54  remove\_largest  remove\_largest  elements  elements  remove 40  countof 5  countof 62  elements  add 35  elements  add 88  remove\_largest  smallest  smallest  largest  add 91  elements  add 26  remove\_smallest  add 0  add 78  add 68  largest  countof 85  remove 30  largest  countof 34  elements  add 66  remove 47  remove\_largest  smallest  remove\_largest  largest  remove\_smallest  remove\_largest  remove 47  largest  smallest  remove\_largest  remove\_largest  remove\_largest  remove\_smallest  remove\_smallest  remove 22  add 39  largest  countof 49  countof 7  remove\_largest  largest  countof 26  add 61  add 25  largest  remove\_smallest  smallest  countof 20  smallest  remove 95  remove\_smallest  countof 1  remove\_smallest  add 50  smallest  elements  smallest  elements  remove\_smallest  add 26  remove\_largest  countof 37  countof 77  remove\_largest  countof 64  add 40  elements  smallest  largest  remove 19  remove 46  countof 76  remove\_smallest  smallest  remove\_largest  add 48  smallest  add 27  add 30  remove\_largest  add 91  add 98  remove\_largest  smallest  add 97  smallest  remove\_smallest  countof 30  remove\_smallest  remove\_largest  add 34  smallest  countof 27  largest  add 84  elements  smallest  remove\_largest  elements  countof 88  remove\_largest  remove\_smallest  smallest  add 34  remove 32  elements  remove 59  smallest  remove\_largest  remove 48  remove\_smallest  add 45  countof 15  countof 37  countof 60  add 83  remove\_largest  remove\_largest  countof 96  largest  countof 82  countof 13  countof 71  countof 20  elements  smallest  smallest  countof 97  remove\_largest  remove\_largest  smallest  countof 53  countof 88  elements  remove\_smallest  remove\_largest  elements  largest  remove\_smallest  add 45  countof 58  smallest  add 1  remove\_smallest  smallest  remove\_smallest  largest  countof 26  add 85  remove 16  remove\_smallest  remove\_smallest  countof 15  remove\_largest  remove 35  largest  countof 10  add 69  smallest  add 18  remove\_smallest  largest  largest  remove\_largest  add 38  elements  smallest  add 22  smallest  add 87  add 26  countof 3  remove\_smallest  largest  add 25  remove 46  remove 19  remove\_largest  add 25  elements  elements  add 98  remove\_smallest  smallest  largest  remove\_smallest  smallest  add 23  remove\_largest  remove\_largest  remove 12  elements  remove 16  smallest  largest  elements  elements  add 1  elements  elements  elements  remove 12  remove 56  countof 34  remove\_smallest  smallest  countof 17  smallest  smallest  smallest  smallest  largest  remove\_smallest  elements  smallest  remove\_largest  remove 90  countof 54  add 2  remove 53  remove 1  elements  add 6  remove\_smallest  smallest  countof 55  countof 53  add 43  add 95  elements  remove\_largest  elements  remove\_smallest  add 1  smallest  countof 12  largest  countof 65  add 20  largest  countof 53  remove\_largest  remove\_largest  smallest  smallest  remove 14  remove 76  elements  remove 3  largest  smallest  smallest  remove 19  elements  countof 78  add 31  remove 51  elements  remove\_largest  remove\_largest  smallest  elements  add 47  elements  elements  elements  add 18  remove\_smallest  remove\_smallest  largest  remove\_smallest  largest  largest  elements  add 73  remove 66  remove\_smallest  countof 84  smallest  add 1  remove\_largest  countof 22  largest  remove 52  largest  largest  remove\_smallest  smallest  remove\_smallest  smallest  remove 5  remove\_smallest  smallest  countof 68  largest  remove 54  countof 52  remove 23  remove\_largest  largest  add 3  remove 7  largest  smallest  elements  countof 73  remove\_largest  remove\_smallest  remove 15  elements  countof 92  add 22  largest  smallest  remove 98  remove 96  countof 95  remove\_smallest  smallest  largest  remove\_smallest  remove\_largest  remove 49  elements  largest  smallest  smallest  remove 14  add 32  remove\_largest  elements  largest  largest  remove 35  smallest  smallest  remove 40  countof 66  remove 23  add 69  remove 91  largest  remove\_smallest  largest  largest  add 90  remove 85  countof 44  remove\_smallest  largest  remove\_smallest  add 48  add 43  add 72  smallest  remove\_largest  largest  remove 5  remove 22  remove\_smallest  remove\_smallest  countof 76  smallest  remove\_largest  add 45  largest  smallest  remove\_largest  remove 83  remove\_smallest  countof 47  countof 95  remove\_largest  remove\_smallest  remove\_smallest  add 17  countof 79  add 96  elements  add 1  smallest  smallest  countof 87  countof 69  remove\_smallest  smallest  add 82  smallest  remove 54  add 29  countof 21  add 17  remove 41  remove 26  remove\_smallest  largest  remove\_smallest  smallest  elements  elements  remove 83  countof 36  largest  add 35  add 96  largest  largest  remove\_largest  remove\_largest  elements  elements  remove 38  largest  add 95  remove\_smallest  remove\_largest  elements  remove\_smallest  remove\_smallest  largest  add 18  largest  remove 50  countof 82  smallest  remove\_smallest  elements  remove 91  add 8  elements  add 24  smallest  remove\_smallest  largest  remove\_smallest  smallest  remove 33  countof 15  smallest  elements  remove 49  elements  smallest  largest  elements  elements  countof 47  remove\_smallest  add 29  elements  remove 21  elements  add 46  smallest  elements  add 58  largest  smallest  add 16  elements  largest  remove\_largest  remove 12  remove 84  elements  countof 19  add 83  remove 13  countof 77  largest  largest  smallest  remove 64  remove 21  remove 30  remove\_smallest  remove\_smallest  smallest  elements  remove\_smallest  elements  smallest  remove 45  elements  remove 29  countof 52  remove\_smallest  smallest  add 21  add 84  countof 16  remove 86  countof 98  add 4  remove\_smallest  largest  remove\_smallest  smallest  largest  elements  smallest  remove\_smallest  smallest  elements  smallest  remove 71  smallest  remove\_largest  countof 80  smallest  smallest  add 74  elements  largest  add 20  largest  add 55  remove 52  remove\_smallest  remove\_smallest  elements  remove 62  elements  remove 92  remove\_largest  remove 11  add 99  add 81  remove\_smallest  countof 70  remove 13  add 76  largest  elements  remove 80  elements  largest  countof 1  remove\_largest  remove\_largest  remove 93  remove 65  smallest  remove 85  elements  elements  elements  remove\_smallest  add 95  remove\_smallest  elements  smallest  remove 48  remove 41  countof 22  smallest  elements  countof 95  add 82  add 66  remove\_smallest  remove\_largest  smallest  remove 73  add 83  countof 31  remove\_largest  remove\_largest  smallest  countof 18  add 49  elements  largest  elements  smallest  remove 71  remove\_smallest  smallest  remove\_smallest  add 47  remove 51  smallest  remove 3  elements  remove 15  elements  remove\_smallest  remove\_smallest  elements  remove\_largest  remove\_smallest  add 17  largest  largest  remove\_largest  add 28  remove\_largest  remove\_smallest  elements  smallest  elements  largest  remove 1  add 0  largest  remove\_smallest  largest  smallest  remove\_smallest  remove\_largest  smallest  remove\_largest  smallest  elements  add 10  remove\_largest  remove 60  add 76  countof 53  add 86  remove\_largest  add 19  smallest  remove\_largest  smallest  remove\_largest  add 34  elements  countof 84  remove\_smallest  add 32  remove 17  smallest  remove 15  remove\_largest  remove 12  remove 77  remove\_largest  remove\_smallest  remove\_largest  elements  remove\_largest  add 48  add 14  remove\_largest  largest  smallest  add 77  smallest  largest  remove\_smallest  countof 95  elements  remove 12  countof 28  remove\_smallest  largest  remove\_smallest  countof 87  add 46  elements  elements  remove\_smallest  add 78  elements  countof 55  remove\_largest  remove\_smallest  remove\_largest  largest  countof 71  elements  countof 69  elements  largest  add 20  countof 36  largest  remove\_smallest  smallest  largest  countof 20  smallest  remove 19  add 35  remove\_smallest  smallest  remove 75  largest  remove\_smallest  largest  largest  add 23  smallest  largest  elements  largest  remove\_largest  smallest  add 32  remove 6  remove 74  largest  countof 30  remove 40  elements  remove 45  smallest  largest  largest  elements  add 43  remove\_largest  elements  remove 92  smallest  largest  add 12  add 13  smallest  add 34  remove\_smallest  remove 92  remove\_largest  elements  add 94  elements  countof 45  remove 22  largest  countof 66  remove\_largest  elements  add 7  largest  smallest  remove\_smallest  add 2  smallest  largest  remove\_smallest  remove\_smallest  smallest  countof 16  remove\_largest  smallest  remove\_smallest  largest  add 47  remove\_smallest  largest  remove\_largest  add 55  remove\_smallest  smallest  add 70  elements  remove 39  remove 7  add 41  smallest  elements  add 23  elements  smallest  smallest  smallest  remove 43  elements  remove 46  remove\_largest  elements  remove\_smallest  largest  remove 23  largest  remove 45  remove\_largest  add 60  add 70  largest  remove 28  countof 9  add 41  elements  remove\_smallest  largest  elements  largest  countof 12  remove 82  countof 64  countof 53  elements  add 72  remove\_largest  elements  remove\_largest  largest  countof 1  add 5  remove\_smallest  remove\_largest  remove\_largest  remove\_largest  countof 98  remove 89  countof 5  elements  countof 13  remove\_smallest  remove\_largest  add 41  elements  remove\_smallest  remove\_smallest  smallest  smallest  smallest  remove\_largest  largest  largest  smallest  countof 24  largest  remove 92  largest  smallest  countof 70  smallest  remove 17  remove\_largest  remove\_largest  remove\_largest | False  0  0  False  False  False  0  False  0  96  0  False  0  False  False  False  0  False  False  0  False  False  False  0  0  False  0  False  0  False  0  False  0  False  False  0  0  0  0  False  False  0  0  False  False  False  0  0  0  0  0  False  False  0  0  False  0  0  0  False  False  0  0  96  False  0  0  False  False  0  False  0  False  False  False  False  80  80  0  False  False  False  False  0  False  0  0  0  False  0  0  0  0  0  53  53  0  0  53  53  0  False  0  0  False  0  0  False  0  26  26  0  False  38  False  False  0  0  False  False  False  0  0  35  35  35  35  35 91  91  0  False  91  0  0 35 68 78 91  False  0  68  False  66  35  False  False  False  False  39  0  0  0  0  61  61  0  61  False  0  False  50  50  50  50  0  0  False  0  40  40  40  False  False  0  0  False  48  27  27  1  34  0  91  34 84 91  34  34 84  0  0  False  34  False  34  False  False  0  0  0  0  0  0  0  0  0  0  0  0  False  False  0  0  0  False  False  0  False  0  45  45  0  0  False  False  0  False  False  0  0  69  69  69  38  38  22  0  87  False  False  25 26 38  25 26 38  26  98  38  False  23  False  23  23  23  23  1 23  1 23  1 23  False  False  0  23  0  23  23  23  23  23  0  False  False  0  False  False  2  6  0  0  6 43 95  6 43  1  0  43  0  43  0  1  1  False  False  1  False  1  1  1  False  1  0  False  1 31  0  47  47  47  0  False  0  0  False  0  0  0  0  False  0  0  False  0  False  0  False  False  0  0  0  False  0  False  False  0  False  3  3  3  0  False  False  0  22  22  False  False  0  0  0  False  False  False  0  0  0  False  0  0  False  0  0  False  0  False  False  69  0  0  False  0  0  False  43  48  False  False  0  0  False  45  45  False  False  0  0  False  False  False  0  17 96  1  1  0  0  17  17  False  0  False  False  96  82  82 96  82 96  False  0  96  96  96  35  35  False  35  False  False  0  18  False  0  18  False  8  8  24  0  False  0  0  False  0  0  0  False  29  False  29  29  29 46  58  29  16 29 46 58  58  False  False  16 29 46  0  False  0  83  83  16  False  False  False  46  46 83  83  83  False  83  False  0  0  0  False  0  84  84  84  84  84  0  0  False  0  False  0  0  0  74  74  74  False  74  False  74  False  False  0  False  99  76 99  False  76 99  99  0  False  False  0  False  False  0  False  False  0  0  0  0  False  0  False  0  0  49  49  49  49  False  0  False  False  47  False  47  False  47  False  False  False  17  17  False  0  0  False  0  0  0  False  False  0  False  0  False  0  19  19  34  0  False  32  False  False  False  False  False  False  False  14  14  14  77  0  77  False  0  0  False  0  46  46  78  0  False  False  0  0  0  0  0  20  0  0  0  0  False  0  False  0  False  0  0  23  23  23  23  0  False  False  32  0  False  32  False  32  32  32  32  32  False  32  32  12  False  13 32  13 32 94  0  False  94  0  13 32  32  7  2  32  32  0  0  False  0  0  False  0  70  False  False  41  41 70  23 41 70  23  23  23  False  23 41 70  False  23 41  41  False  41  False  70  False  0  41 60 70  70  60 70  70  0  False  0  0  60 70  60 70  60  0  False  False  0  False  0  0  False  False  41  False  0  0  0  False  0  0  0  0  0  False  0  0  0  0  False  False  False  False |
| Задача 12. Пристигащи и заминаващи автобуси в даден интервал | |
| **Условие**  \* Даден е списък с времената на пристигане и заминаване на всички автобуси от дадена автогара. Да се напише програма, която използ­вайки HashSet класa по даден интервал (начало, край) намира броя автобуси, които успяват да пристигнат и да напуснат авто­гарата.  Пример:  08:22-09:05  4  08:24-08:33  08:20-09:00  08:32-08:37  09:00-09:15  Резултат:  2 | |
| **Описание на входа**  На първия ред е даден интервалът, в рамките на който търсим броя автобуси. На втория ред е дадено цяло число n (n е между 0 и 1000). На следващите n реда са дадени данните за n автобуса.  Всички интервали са в следния формат: "hh:mm-hh:mm". | |
| **Описание на изхода**  На един единствен ред на онзолата се извежда търсеният брой автобуси. | |
| **Анализ на задачата**  Очевидното решение е да проверим всеки от автобусите дали пристига и си тръгва в посочения интервал. Според условието на задачата, обаче, трябва да ползваме класа **HashSet**.  Решението е такова: Можем да намерим множествата на всички автобуси, които пристигат след началния час и на всички автобуси, отпътуващи преди крайния час. Сечението на тези множества дава търсените автобуси. Ако **TimeInterval** е клас който съхранява разписанието на един автобус, сечението можем да намерим с **HashSet< TimeInterval>** при подходящо дефинирани **GetHashCode()** и **Equals()**. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  class Time : IComparable<Time>  {  private int hours;  private int minutes;  public int Hours  {  get  {  return this.hours;  }  set  {  if (value < 0 || 23 < value)  {  throw new ArgumentOutOfRangeException("Minutes must be between 0 and 59.");  }  this.hours = value;  }  }  public int Minutes  {  get  {  return this.minutes;  }  set  {  if (value < 0 || 59 < value)  {  throw new ArgumentOutOfRangeException("Minutes must be between 0 and 59.");  }  this.minutes = value;  }  }  public Time(int hours, int minutes)  {  this.Hours = hours;  this.Minutes = minutes;  }  public int CompareTo(Time other)  {  if (this.Hours < other.Hours)  {  return -1;  }  else if (this.Hours > other.Hours)  {  return 1;  }  else  {  if (this.Minutes < other.Minutes)  {  return -1;  }  else if (this.Minutes > other.Minutes)  {  return 1;  }  else  {  return 0;  }  }  }  }  class TimeInterval : IEqualityComparer<TimeInterval>  {  public Time ArrivalTime { get; set; }  public Time DepartureTime { get; set; }  public TimeInterval(Time arrivalTime, Time departureTime)  {  this.ArrivalTime = arrivalTime;  this.DepartureTime = departureTime;  }  public bool Equals(TimeInterval x, TimeInterval y)  {  bool result = x.ArrivalTime == y.ArrivalTime &&  x.DepartureTime == y.DepartureTime;  return result;  }  public int GetHashCode(TimeInterval interval)  {  int hashCode = (interval.ArrivalTime.Hours.GetHashCode() \*  interval.ArrivalTime.Minutes.GetHashCode()) ^  (interval.DepartureTime.Hours.GetHashCode() \*  interval.DepartureTime.Minutes.GetHashCode());  return hashCode;  }  }  class BussesManagement  {  static void Main(string[] args)  {  Time intervalStart;  Time intervalEnd;  GetInterval(out intervalStart, out intervalEnd);  List<TimeInterval> busses = GetBusses();  int bussesInIntervalCount = GetBussesInInterval(busses, intervalStart, intervalEnd);  Console.WriteLine(bussesInIntervalCount);  }  private static void GetInterval(out Time intervalStart, out Time intervalEnd)  {  string inputLine = Console.ReadLine();  GetStartAndEndInterval(inputLine, out intervalStart, out intervalEnd);  }  private static List<TimeInterval> GetBusses()  {  string bussesCountInputLine = Console.ReadLine();  int bussesCount = int.Parse(bussesCountInputLine);  List<TimeInterval> busses = new List<TimeInterval>();  for (int i = 0; i < bussesCount; i++)  {  string inputLine = Console.ReadLine();  Time arrivalTime;  Time departureTime;  GetStartAndEndInterval(inputLine, out arrivalTime, out departureTime);    TimeInterval currentBus = new TimeInterval(arrivalTime, departureTime);  busses.Add(currentBus);  }  return busses;  }  private static void GetStartAndEndInterval(string inputLine,  out Time intervalStart, out Time intervalEnd)  {  string[] tokens = inputLine.Split(new char[] { ' ', ':', '-' },  StringSplitOptions.RemoveEmptyEntries);  int intervalStartHours = int.Parse(tokens[0]);  int intervalStartMinutes = int.Parse(tokens[1]);  intervalStart = new Time(intervalStartHours, intervalStartMinutes);  int intervalEndHours = int.Parse(tokens[2]);  int intervalEndMinutes = int.Parse(tokens[3]);  intervalEnd = new Time(intervalEndHours, intervalEndMinutes);  }  private static int GetBussesInInterval(List<TimeInterval> busses,  Time intervalStart, Time intervalEnd)  {  HashSet<TimeInterval> arrivalFittingBusses = new HashSet<TimeInterval>();  foreach (TimeInterval bus in busses)  {  if (intervalStart.CompareTo(bus.ArrivalTime) <= 0)  {  arrivalFittingBusses.Add(bus);  }  }  HashSet<TimeInterval> departureFittingBusses = new HashSet<TimeInterval>();  foreach (TimeInterval bus in busses)  {  if (intervalEnd.CompareTo(bus.DepartureTime) >= 0)  {  departureFittingBusses.Add(bus);  }  }  arrivalFittingBusses.IntersectWith(departureFittingBusses);  int fittingBussesCount = arrivalFittingBusses.Count;  return fittingBussesCount;  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * 0 интервала * 1000 интервала * 1000 интервала и начален интервал от време, при който нито един от интервалите не изпълнява условието | |
| **Вход** | **Изход** |
| 08:22-09:05  4  08:24-08:33  08:20-09:00  08:32-08:37  09:00-09:15 | 2 |
| **Вход** | **Изход** |
| 08:22-09:05  0 | 0 |
| **Вход** | **Изход** |
| 05:54-23:57  86  15:17-22:18  05:06-13:47  08:01-13:32  12:22-23:31  20:23-21:45  21:48-21:54  21:09-22:23  19:38-20:53  21:09-22:23  19:43-22:48  16:57-19:58  18:18-23:34  15:23-15:45  17:48-22:54  12:37-22:44  20:34-23:55  09:51-18:52  03:05-10:27  03:05-10:27  21:04-21:40  11:56-13:57  22:33-22:45  23:29-23:47  19:43-22:48  16:57-19:58  00:05-05:07  22:33-22:45  20:13-23:20  13:57-16:58  09:31-16:41  12:22-23:31  10:27-10:42  11:56-13:57  13:57-16:58  15:03-22:54  17:42-20:58  01:34-09:55  13:57-16:58  07:11-07:12  07:26-23:30  14:27-18:43  01:34-09:55  19:53-20:58  23:19-23:24  04:20-15:25  03:50-11:53  18:09-19:53  11:41-14:45  00:54-13:57  21:58-23:59  05:16-07:27  18:23-18:58  15:17-22:18  12:22-23:31  21:19-21:49  03:35-13:41  17:28-21:54  05:06-13:47  13:12-15:47  13:07-13:15  22:24-23:58  00:05-05:07  10:12-11:30  11:46-17:56  06:30-12:58  23:19-23:24  17:13-21:48  12:17-20:43  12:37-22:44  18:03-23:19  06:50-15:56  06:45-11:46  18:03-23:19  18:47-18:50  06:45-11:46  20:13-23:20  20:28-22:35  16:57-19:58  02:15-02:53  12:17-20:43  22:44-23:54  15:23-15:45  00:49-07:58  03:50-11:53  08:46-14:52  23:29-23:47 | 68 |
| **Вход** | **Изход** |
| 09:21-21:54  121  15:17-22:18  11:46-17:56  23:14-23:37  09:21-21:54  18:18-23:34  14:27-18:43  02:10-19:24  18:03-23:19  02:15-02:53  12:31-19:51  04:20-15:25  19:38-20:53  07:06-20:28  14:32-21:35  18:47-18:50  21:09-22:23  13:12-15:47  22:33-22:45  16:37-18:45  05:54-23:57  00:49-07:58  02:10-19:24  17:48-22:54  15:23-15:45  16:37-18:45  23:29-23:47  21:58-23:59  16:08-17:35  22:33-22:45  08:46-14:52  17:28-21:54  23:58-23:59  22:24-23:58  23:58-23:59  03:44-06:54  10:06-22:47  18:18-23:34  17:28-21:54  02:15-02:53  10:12-11:30  04:20-15:25  11:46-17:56  13:51-13:52  20:13-23:20  15:17-22:18  19:38-20:53  06:30-12:58  05:54-23:57  12:22-23:31  21:19-21:49  15:17-22:18  09:31-16:41  09:51-18:52  15:17-22:18  14:27-18:43  12:17-20:43  23:29-23:47  01:39-15:48  03:35-13:41  23:19-23:24  04:20-15:25  03:50-11:53  19:38-20:53  04:20-15:25  17:13-21:48  21:09-22:23  07:06-20:28  12:37-22:44  11:56-13:57  02:30-22:58  02:00-04:46  06:35-17:49  00:49-07:58  23:14-23:37  05:06-13:47  17:33-22:45  17:48-22:54  19:43-22:48  23:14-23:37  14:47-20:50  16:08-17:35  09:51-18:52  08:16-12:43  06:45-11:46  16:37-18:45  18:47-18:50  19:38-20:53  12:37-22:44  08:40-10:56  19:58-21:59  16:08-17:35  10:27-10:42  18:23-18:58  07:26-23:30  17:42-20:58  18:18-23:34  15:17-22:18  20:23-21:45  02:10-19:24  11:56-13:57  22:24-23:58  22:24-23:58  11:46-17:56  04:40-18:55  17:28-21:54  13:12-15:47  13:12-15:47  08:46-14:52  14:42-18:52  01:24-17:37  12:17-20:43  20:34-23:55  12:17-20:43  06:35-17:49  07:21-18:40  12:17-20:43  00:05-05:07  18:23-18:58  22:33-22:45  09:16-17:28  12:22-23:31 | 47 |
| **Вход** | **Изход** |
| 20:13-23:20  235  18:23-18:58  00:54-13:57  22:39-23:41  22:53-22:54  09:21-21:54  18:23-18:58  07:06-20:28  16:37-18:45  07:11-07:12  15:17-22:18  03:05-10:27  20:34-23:55  01:24-17:37  17:33-22:45  19:38-20:53  08:46-14:52  09:51-18:52  07:11-07:12  12:37-22:44  23:58-23:59  12:37-22:44  14:27-18:43  02:10-19:24  21:09-22:23  12:31-19:51  16:57-19:58  13:12-15:47  21:19-21:49  13:57-16:58  11:41-14:45  03:35-13:41  08:55-09:58  13:12-15:47  22:33-22:45  22:39-23:41  16:52-17:55  04:10-22:41  09:51-18:52  20:28-22:35  12:37-22:44  06:50-15:56  17:28-21:54  06:50-15:56  12:31-19:51  07:21-18:40  22:39-23:41  14:47-20:50  16:57-19:58  12:22-23:31  22:33-22:45  20:13-23:20  20:23-21:45  16:57-19:58  07:06-20:28  23:14-23:37  03:05-10:27  09:36-20:58  18:18-23:34  20:13-23:20  10:12-11:30  04:20-15:25  03:35-13:41  07:11-07:12  07:21-18:40  10:51-23:56  05:01-09:11  06:30-12:58  14:42-18:52  18:03-23:19  20:34-23:55  03:44-06:54  10:51-23:56  10:51-23:56  17:48-22:54  11:56-13:57  05:01-09:11  13:07-13:15  18:09-19:53  13:57-16:58  18:23-18:58  07:41-21:45  07:06-20:28  18:47-18:50  02:15-02:53  08:16-12:43  18:03-23:19  08:46-14:52  16:57-19:58  03:50-11:53  00:05-05:07  11:46-17:56  04:40-18:55  11:46-17:56  03:05-10:27  18:09-19:53  13:07-13:15  14:47-20:50  22:39-23:41  12:31-19:51  06:50-15:56  15:17-22:18  11:56-13:57  21:04-21:40  09:36-20:58  12:37-22:44  20:13-23:20  08:40-10:56  04:40-18:55  01:39-15:48  22:44-23:54  13:07-13:15  08:16-12:43  09:51-18:52  07:21-18:40  08:01-13:32  07:06-20:28  08:55-09:58  22:44-23:54  16:52-17:55  09:36-20:58  20:23-21:45  18:03-23:19  15:23-15:45  23:29-23:47  08:55-09:58  03:35-13:41  16:52-17:55  12:17-20:43  09:31-16:41  21:58-23:59  08:01-13:32  08:16-12:43  17:28-21:54  12:37-22:44  02:15-02:53  06:35-17:49  03:50-11:53  14:42-18:52  07:26-23:30  22:53-22:54  09:31-16:41  09:36-20:58  02:10-19:24  22:53-22:54  10:06-22:47  21:19-21:49  23:19-23:24  15:17-22:18  17:13-21:48  10:12-11:30  15:03-22:54  09:51-18:52  16:37-18:45  19:43-22:48  09:36-20:58  20:23-21:45  12:22-23:31  03:05-10:27  00:49-07:58  19:53-20:58  21:09-22:23  00:54-13:57  05:01-09:11  03:50-11:53  13:51-13:52  09:21-21:54  01:39-15:48  20:23-21:45  22:53-22:54  12:17-20:43  08:46-14:52  22:44-23:54  02:10-19:24  23:29-23:47  23:14-23:37  15:17-22:18  03:44-06:54  16:37-18:45  12:31-19:51  16:08-17:35  08:46-14:52  05:06-13:47  17:13-21:48  16:08-17:35  10:27-10:42  04:40-18:55  02:30-22:58  14:32-21:35  13:51-13:52  17:42-20:58  11:02-16:53  17:33-22:45  07:41-21:45  22:24-23:58  17:33-22:45  13:07-13:15  14:27-18:43  03:50-11:53  19:53-20:58  05:16-07:27  06:30-12:58  14:47-20:50  10:12-11:30  10:27-10:42  01:34-09:55  10:06-22:47  17:33-22:45  11:56-13:57  19:38-20:53  04:10-22:41  21:09-22:23  06:35-17:49  14:42-18:52  13:12-15:47  09:16-17:28  20:34-23:55  06:50-15:56  07:41-21:45  10:12-11:30  02:00-04:46  01:39-15:48  09:16-17:28  23:19-23:24  15:03-22:54  06:45-11:46  08:01-13:32  09:51-18:52  20:34-23:55  22:44-23:54  21:58-23:59  23:58-23:59  04:25-20:50  14:32-21:35  11:46-17:56  08:46-14:52 | 20 |
| **Вход** | **Изход** |
| 20:13-23:20  318  23:14-23:37  16:08-17:35  23:58-23:59  00:05-05:07  06:35-17:49  07:06-20:28  07:06-20:28  04:10-22:41  23:14-23:37  08:46-14:52  00:49-07:58  11:41-14:45  07:41-21:45  07:21-18:40  18:47-18:50  03:44-06:54  07:11-07:12  14:32-21:35  21:04-21:40  16:57-19:58  23:19-23:24  12:31-19:51  14:42-18:52  19:38-20:53  09:36-20:58  23:58-23:59  20:13-23:20  10:51-23:56  13:12-15:47  07:26-23:30  07:21-18:40  04:25-20:50  01:24-17:37  11:41-14:45  01:34-09:55  15:23-15:45  08:40-10:56  06:50-15:56  16:37-18:45  05:54-23:57  08:01-13:32  06:35-17:49  23:58-23:59  03:35-13:41  08:55-09:58  20:23-21:45  05:01-09:11  09:21-21:54  17:28-21:54  19:53-20:58  23:14-23:37  06:35-17:49  04:40-18:55  21:04-21:40  17:33-22:45  22:33-22:45  12:17-20:43  21:09-22:23  08:16-12:43  06:45-11:46  15:23-15:45  07:06-20:28  08:46-14:52  21:19-21:49  12:17-20:43  13:12-15:47  03:05-10:27  18:09-19:53  05:54-23:57  08:55-09:58  17:13-21:48  18:09-19:53  21:04-21:40  02:00-04:46  18:47-18:50  16:52-17:55  22:24-23:58  21:58-23:59  22:33-22:45  12:22-23:31  11:46-17:56  04:40-18:55  22:53-22:54  04:10-22:41  18:03-23:19  17:33-22:45  05:16-07:27  21:09-22:23  22:39-23:41  02:10-19:24  02:15-02:53  04:20-15:25  15:23-15:45  04:40-18:55  07:21-18:40  00:05-05:07  08:40-10:56  20:28-22:35  02:10-19:24  12:31-19:51  21:48-21:54  15:23-15:45  15:17-22:18  08:40-10:56  00:49-07:58  22:53-22:54  08:40-10:56  12:31-19:51  13:07-13:15  00:49-07:58  16:57-19:58  02:10-19:24  10:27-10:42  06:45-11:46  23:29-23:47  22:33-22:45  14:42-18:52  14:27-18:43  13:07-13:15  12:31-19:51  18:47-18:50  22:44-23:54  07:21-18:40  08:16-12:43  23:29-23:47  18:23-18:58  08:16-12:43  22:53-22:54  18:47-18:50  12:31-19:51  18:03-23:19  19:43-22:48  23:19-23:24  03:50-11:53  01:24-17:37  00:54-13:57  23:14-23:37  12:22-23:31  21:09-22:23  13:57-16:58  08:01-13:32  16:52-17:55  19:53-20:58  08:40-10:56  02:00-04:46  11:56-13:57  11:41-14:45  20:28-22:35  15:03-22:54  19:38-20:53  20:13-23:20  22:44-23:54  06:30-12:58  07:26-23:30  03:35-13:41  16:52-17:55  19:53-20:58  00:49-07:58  14:42-18:52  11:56-13:57  18:09-19:53  15:17-22:18  16:52-17:55  18:23-18:58  05:54-23:57  07:06-20:28  07:21-18:40  17:28-21:54  21:09-22:23  15:23-15:45  16:08-17:35  18:09-19:53  10:06-22:47  16:57-19:58  21:19-21:49  19:43-22:48  14:42-18:52  21:48-21:54  04:25-20:50  11:41-14:45  06:50-15:56  11:56-13:57  05:01-09:11  16:57-19:58  14:27-18:43  13:07-13:15  00:05-05:07  15:03-22:54  10:06-22:47  20:23-21:45  16:52-17:55  22:33-22:45  09:31-16:41  09:21-21:54  23:19-23:24  16:52-17:55  17:48-22:54  18:18-23:34  20:34-23:55  06:45-11:46  14:27-18:43  22:44-23:54  03:50-11:53  04:10-22:41  21:19-21:49  19:53-20:58  11:46-17:56  07:21-18:40  21:58-23:59  01:39-15:48  07:41-21:45  20:13-23:20  00:54-13:57  02:10-19:24  09:36-20:58  07:21-18:40  14:47-20:50  17:42-20:58  14:47-20:50  21:19-21:49  00:49-07:58  14:27-18:43  17:13-21:48  12:37-22:44  09:21-21:54  04:25-20:50  20:28-22:35  17:33-22:45  10:27-10:42  15:17-22:18  07:26-23:30  13:12-15:47  06:45-11:46  21:48-21:54  07:06-20:28  00:54-13:57  12:37-22:44  11:41-14:45  18:47-18:50  12:22-23:31  06:50-15:56  16:52-17:55  05:54-23:57  02:15-02:53  06:30-12:58  18:47-18:50  02:10-19:24  06:30-12:58  05:16-07:27  03:50-11:53  06:35-17:49  23:14-23:37  08:01-13:32  10:06-22:47  22:44-23:54  17:48-22:54  15:23-15:45  08:01-13:32  23:19-23:24  03:44-06:54  09:16-17:28  22:44-23:54  01:24-17:37  23:29-23:47  22:44-23:54  16:37-18:45  19:58-21:59  02:15-02:53  17:13-21:48  02:30-22:58  23:14-23:37  13:57-16:58  21:04-21:40  01:34-09:55  08:16-12:43  18:47-18:50  20:23-21:45  08:46-14:52  05:16-07:27  14:42-18:52  13:07-13:15  13:07-13:15  17:48-22:54  17:28-21:54  13:12-15:47  07:21-18:40  15:03-22:54  18:47-18:50  16:52-17:55  07:06-20:28  20:23-21:45  03:44-06:54  16:52-17:55  20:34-23:55  13:57-16:58  00:54-13:57  19:58-21:59  23:14-23:37  08:01-13:32  18:23-18:58  04:20-15:25  17:42-20:58  05:06-13:47  20:34-23:55  03:44-06:54  10:27-10:42  19:58-21:59  06:35-17:49  19:38-20:53  14:47-20:50  08:16-12:43  06:45-11:46  08:16-12:43  20:28-22:35  18:09-19:53  13:57-16:58  22:44-23:54  07:06-20:28 | 33 |
| **Вход** | **Изход** |
| 10:51-23:56  705  06:30-12:58  15:23-15:45  02:30-22:58  23:19-23:24  12:31-19:51  13:12-15:47  04:10-22:41  07:26-23:30  01:34-09:55  19:38-20:53  11:41-14:45  14:27-18:43  01:39-15:48  10:51-23:56  08:46-14:52  02:30-22:58  16:52-17:55  17:42-20:58  22:44-23:54  00:05-05:07  20:28-22:35  12:22-23:31  22:53-22:54  02:30-22:58  08:46-14:52  06:45-11:46  23:14-23:37  16:52-17:55  17:48-22:54  19:58-21:59  03:50-11:53  08:16-12:43  21:58-23:59  04:20-15:25  19:58-21:59  23:14-23:37  19:38-20:53  23:29-23:47  22:33-22:45  07:41-21:45  21:09-22:23  08:16-12:43  06:50-15:56  04:10-22:41  05:06-13:47  23:14-23:37  22:44-23:54  13:51-13:52  10:12-11:30  01:34-09:55  16:57-19:58  07:26-23:30  17:33-22:45  03:35-13:41  06:30-12:58  11:56-13:57  04:20-15:25  17:48-22:54  01:24-17:37  05:54-23:57  00:49-07:58  17:48-22:54  07:26-23:30  22:24-23:58  21:19-21:49  20:13-23:20  04:20-15:25  20:28-22:35  08:40-10:56  08:40-10:56  17:42-20:58  22:53-22:54  18:18-23:34  20:34-23:55  19:43-22:48  05:01-09:11  11:02-16:53  16:52-17:55  00:54-13:57  20:23-21:45  12:31-19:51  09:31-16:41  10:12-11:30  03:05-10:27  02:10-19:24  13:12-15:47  01:34-09:55  10:12-11:30  08:40-10:56  19:53-20:58  06:45-11:46  07:21-18:40  20:13-23:20  10:27-10:42  17:42-20:58  09:51-18:52  11:41-14:45  06:35-17:49  12:22-23:31  08:01-13:32  18:03-23:19  01:24-17:37  15:03-22:54  01:39-15:48  12:22-23:31  05:54-23:57  12:17-20:43  14:47-20:50  12:22-23:31  05:01-09:11  17:42-20:58  16:57-19:58  15:03-22:54  04:10-22:41  22:53-22:54  14:27-18:43  06:45-11:46  09:51-18:52  20:23-21:45  00:54-13:57  06:30-12:58  11:56-13:57  22:39-23:41  18:18-23:34  07:26-23:30  09:31-16:41  00:49-07:58  01:39-15:48  14:42-18:52  04:40-18:55  17:28-21:54  15:17-22:18  21:19-21:49  15:03-22:54  18:09-19:53  09:16-17:28  04:20-15:25  08:40-10:56  01:34-09:55  07:06-20:28  00:05-05:07  15:17-22:18  08:40-10:56  07:11-07:12  19:58-21:59  18:18-23:34  14:27-18:43  09:51-18:52  22:24-23:58  01:24-17:37  02:15-02:53  07:21-18:40  09:21-21:54  05:16-07:27  12:22-23:31  00:54-13:57  08:16-12:43  14:32-21:35  11:02-16:53  02:00-04:46  22:53-22:54  16:08-17:35  11:56-13:57  02:30-22:58  11:41-14:45  12:17-20:43  18:47-18:50  10:51-23:56  14:32-21:35  11:46-17:56  09:16-17:28  08:55-09:58  07:26-23:30  17:48-22:54  23:58-23:59  19:43-22:48  13:07-13:15  19:58-21:59  03:50-11:53  23:58-23:59  05:54-23:57  08:46-14:52  13:07-13:15  05:06-13:47  01:34-09:55  21:58-23:59  22:44-23:54  09:51-18:52  07:11-07:12  11:02-16:53  06:30-12:58  18:18-23:34  14:27-18:43  15:23-15:45  14:42-18:52  18:47-18:50  09:51-18:52  11:41-14:45  19:38-20:53  06:50-15:56  22:39-23:41  14:27-18:43  04:10-22:41  04:25-20:50  02:00-04:46  04:10-22:41  17:42-20:58  21:04-21:40  16:08-17:35  21:09-22:23  22:39-23:41  17:48-22:54  22:33-22:45  22:53-22:54  20:13-23:20  12:17-20:43  02:10-19:24  22:39-23:41  00:05-05:07  13:51-13:52  18:03-23:19  03:44-06:54  20:28-22:35  21:19-21:49  16:08-17:35  08:46-14:52  16:37-18:45  09:51-18:52  02:15-02:53  15:03-22:54  04:40-18:55  01:34-09:55  23:29-23:47  14:47-20:50  18:09-19:53  19:58-21:59  14:27-18:43  02:30-22:58  13:57-16:58  00:54-13:57  21:04-21:40  00:49-07:58  03:35-13:41  14:32-21:35  23:14-23:37  06:30-12:58  06:35-17:49  21:04-21:40  05:01-09:11  12:17-20:43  21:09-22:23  09:21-21:54  16:08-17:35  05:54-23:57  11:56-13:57  06:45-11:46  11:46-17:56  12:22-23:31  05:06-13:47  11:02-16:53  22:24-23:58  01:39-15:48  12:37-22:44  11:56-13:57  16:37-18:45  20:13-23:20  04:10-22:41  01:34-09:55  20:34-23:55  06:45-11:46  21:58-23:59  17:28-21:54  13:12-15:47  16:57-19:58  21:19-21:49  11:02-16:53  04:40-18:55  10:27-10:42  08:55-09:58  20:28-22:35  07:41-21:45  00:05-05:07  14:42-18:52  00:49-07:58  11:41-14:45  04:10-22:41  13:57-16:58  17:42-20:58  14:42-18:52  23:14-23:37  07:21-18:40  06:35-17:49  13:12-15:47  19:43-22:48  12:22-23:31  00:54-13:57  05:01-09:11  21:09-22:23  21:04-21:40  02:10-19:24  06:50-15:56  16:52-17:55  18:18-23:34  10:06-22:47  14:27-18:43  03:50-11:53  01:39-15:48  16:57-19:58  13:07-13:15  04:25-20:50  19:53-20:58  18:09-19:53  03:35-13:41  20:28-22:35  09:51-18:52  03:50-11:53  10:06-22:47  22:39-23:41  22:24-23:58  16:57-19:58  00:05-05:07  05:16-07:27  15:23-15:45  07:11-07:12  22:33-22:45  19:53-20:58  08:46-14:52  16:37-18:45  14:27-18:43  13:12-15:47  04:10-22:41  23:19-23:24  23:14-23:37  05:54-23:57  07:26-23:30  01:39-15:48  05:54-23:57  14:27-18:43  20:13-23:20  12:22-23:31  21:19-21:49  02:30-22:58  03:44-06:54  14:47-20:50  21:09-22:23  17:42-20:58  02:10-19:24  03:35-13:41  15:23-15:45  20:23-21:45  13:57-16:58  17:13-21:48  09:36-20:58  09:36-20:58  19:53-20:58  18:23-18:58  18:18-23:34  09:16-17:28  11:41-14:45  12:22-23:31  05:54-23:57  07:11-07:12  01:39-15:48  04:25-20:50  22:24-23:58  12:22-23:31  06:45-11:46  21:48-21:54  06:50-15:56  07:21-18:40  21:04-21:40  06:30-12:58  12:17-20:43  03:50-11:53  18:47-18:50  03:05-10:27  12:22-23:31  18:23-18:58  03:50-11:53  09:21-21:54  16:52-17:55  15:03-22:54  06:45-11:46  05:54-23:57  10:06-22:47  21:48-21:54  01:34-09:55  07:26-23:30  14:32-21:35  17:33-22:45  06:30-12:58  18:47-18:50  20:34-23:55  01:39-15:48  18:18-23:34  12:17-20:43  11:41-14:45  03:50-11:53  14:32-21:35  08:55-09:58  10:06-22:47  21:09-22:23  14:32-21:35  07:11-07:12  16:08-17:35  18:18-23:34  22:44-23:54  05:54-23:57  01:39-15:48  21:19-21:49  16:52-17:55  17:42-20:58  11:56-13:57  06:50-15:56  07:21-18:40  18:23-18:58  12:17-20:43  19:53-20:58  17:28-21:54  18:23-18:58  11:56-13:57  16:08-17:35  11:46-17:56  17:48-22:54  11:41-14:45  01:24-17:37  03:44-06:54  16:08-17:35  20:23-21:45  23:19-23:24  14:32-21:35  08:40-10:56  14:42-18:52  18:03-23:19  22:24-23:58  12:31-19:51  18:18-23:34  15:23-15:45  06:35-17:49  21:19-21:49  16:52-17:55  06:30-12:58  16:37-18:45  22:44-23:54  00:49-07:58  06:35-17:49  12:22-23:31  01:34-09:55  17:28-21:54  04:25-20:50  10:51-23:56  09:36-20:58  09:31-16:41  01:39-15:48  14:47-20:50  11:46-17:56  20:13-23:20  14:32-21:35  07:21-18:40  01:34-09:55  14:42-18:52  17:28-21:54  08:40-10:56  18:09-19:53  05:54-23:57  18:03-23:19  13:51-13:52  15:03-22:54  06:35-17:49  12:37-22:44  23:14-23:37  14:42-18:52  17:48-22:54  01:39-15:48  12:22-23:31  15:17-22:18  09:21-21:54  06:50-15:56  03:50-11:53  22:53-22:54  17:33-22:45  07:41-21:45  21:48-21:54  20:28-22:35  12:37-22:44  10:27-10:42  04:40-18:55  17:33-22:45  21:04-21:40  04:25-20:50  02:10-19:24  08:16-12:43  19:53-20:58  16:52-17:55  06:45-11:46  09:16-17:28  08:40-10:56  15:17-22:18  04:40-18:55  16:37-18:45  16:52-17:55  20:28-22:35  11:46-17:56  09:21-21:54  15:03-22:54  01:39-15:48  21:19-21:49  01:39-15:48  05:06-13:47  09:21-21:54  01:34-09:55  07:11-07:12  22:33-22:45  13:57-16:58  12:31-19:51  12:31-19:51  06:30-12:58  17:42-20:58  11:02-16:53  12:17-20:43  07:11-07:12  00:49-07:58  11:46-17:56  07:41-21:45  21:19-21:49  08:46-14:52  12:37-22:44  00:05-05:07  06:45-11:46  13:57-16:58  17:28-21:54  05:54-23:57  07:41-21:45  09:21-21:54  04:10-22:41  20:13-23:20  18:03-23:19  05:16-07:27  15:17-22:18  21:48-21:54  23:58-23:59  02:10-19:24  05:16-07:27  22:33-22:45  02:00-04:46  11:46-17:56  20:34-23:55  10:27-10:42  09:51-18:52  22:44-23:54  08:16-12:43  08:46-14:52  08:46-14:52  14:32-21:35  02:15-02:53  20:34-23:55  13:12-15:47  09:36-20:58  17:33-22:45  00:05-05:07  06:50-15:56  20:23-21:45  06:45-11:46  02:00-04:46  03:44-06:54  06:30-12:58  05:01-09:11  05:01-09:11  08:55-09:58  14:27-18:43  16:37-18:45  18:03-23:19  12:17-20:43  12:22-23:31  17:48-22:54  16:52-17:55  00:05-05:07  00:05-05:07  03:50-11:53  08:40-10:56  17:42-20:58  07:41-21:45  19:43-22:48  12:31-19:51  10:12-11:30  02:30-22:58  01:39-15:48  02:00-04:46  00:54-13:57  13:07-13:15  00:49-07:58  13:57-16:58  10:51-23:56  08:01-13:32  20:28-22:35  14:27-18:43  00:54-13:57  01:24-17:37  12:37-22:44  07:21-18:40  05:54-23:57  14:42-18:52  01:39-15:48  17:33-22:45  05:16-07:27  12:22-23:31  07:21-18:40  13:12-15:47  02:15-02:53  20:13-23:20  19:38-20:53  23:58-23:59  16:37-18:45  08:01-13:32  06:30-12:58  16:57-19:58  17:28-21:54  11:02-16:53  21:19-21:49  18:03-23:19  09:21-21:54  13:51-13:52  09:36-20:58  23:19-23:24  18:09-19:53  20:28-22:35  07:21-18:40  21:04-21:40  03:44-06:54  13:12-15:47  20:28-22:35  21:48-21:54  05:16-07:27  19:38-20:53  08:16-12:43  13:51-13:52  04:10-22:41  07:41-21:45  00:05-05:07  21:58-23:59  18:18-23:34  16:57-19:58  17:33-22:45  14:32-21:35  16:37-18:45  11:41-14:45  07:11-07:12  07:21-18:40  12:22-23:31  21:19-21:49  14:47-20:50  07:41-21:45  09:36-20:58  17:42-20:58  02:30-22:58  20:34-23:55  22:53-22:54  06:50-15:56  09:16-17:28  08:55-09:58  16:52-17:55  14:47-20:50  09:36-20:58  06:50-15:56  05:16-07:27  21:58-23:59  12:31-19:51  14:47-20:50  05:16-07:27  21:09-22:23  22:39-23:41  03:35-13:41  21:48-21:54  23:29-23:47  05:16-07:27  22:53-22:54  13:07-13:15  17:13-21:48  06:50-15:56  06:35-17:49  17:48-22:54  10:51-23:56  02:30-22:58  11:56-13:57  22:33-22:45  06:35-17:49  17:42-20:58  11:41-14:45  22:39-23:41  10:51-23:56  08:46-14:52  03:50-11:53  08:16-12:43  15:17-22:18  09:36-20:58  08:01-13:32  06:30-12:58  10:51-23:56  14:47-20:50  18:47-18:50  16:57-19:58  22:53-22:54  19:53-20:58  19:43-22:48  09:31-16:41 | 381 |
| **Вход** | **Изход** |
| 19:58-21:59  621  13:12-15:47  04:10-22:41  09:31-16:41  17:28-21:54  22:24-23:58  20:28-22:35  03:05-10:27  03:50-11:53  20:13-23:20  02:10-19:24  14:42-18:52  12:17-20:43  18:18-23:34  07:11-07:12  00:05-05:07  14:32-21:35  01:24-17:37  06:50-15:56  12:22-23:31  16:08-17:35  22:39-23:41  13:07-13:15  19:43-22:48  00:05-05:07  06:35-17:49  02:00-04:46  04:10-22:41  03:50-11:53  00:05-05:07  22:53-22:54  12:17-20:43  10:06-22:47  18:03-23:19  14:42-18:52  21:19-21:49  15:03-22:54  11:46-17:56  23:58-23:59  11:41-14:45  00:05-05:07  22:44-23:54  20:34-23:55  21:04-21:40  00:54-13:57  09:31-16:41  22:24-23:58  22:39-23:41  08:46-14:52  20:23-21:45  08:46-14:52  21:48-21:54  23:58-23:59  14:27-18:43  14:42-18:52  09:21-21:54  23:14-23:37  13:57-16:58  13:57-16:58  04:40-18:55  00:54-13:57  14:27-18:43  10:06-22:47  20:34-23:55  03:50-11:53  07:41-21:45  03:44-06:54  11:02-16:53  14:27-18:43  15:23-15:45  07:11-07:12  20:34-23:55  12:17-20:43  05:01-09:11  05:06-13:47  10:12-11:30  19:53-20:58  20:34-23:55  12:37-22:44  14:42-18:52  18:03-23:19  09:51-18:52  13:12-15:47  06:35-17:49  14:27-18:43  23:14-23:37  17:48-22:54  06:30-12:58  09:51-18:52  09:51-18:52  20:13-23:20  06:35-17:49  08:40-10:56  13:07-13:15  03:35-13:41  08:46-14:52  23:29-23:47  10:51-23:56  11:02-16:53  22:44-23:54  16:37-18:45  04:10-22:41  07:21-18:40  10:12-11:30  05:01-09:11  17:42-20:58  20:23-21:45  11:46-17:56  02:10-19:24  21:19-21:49  08:16-12:43  07:11-07:12  18:09-19:53  22:24-23:58  08:46-14:52  20:34-23:55  18:03-23:19  21:19-21:49  05:16-07:27  03:44-06:54  18:23-18:58  07:06-20:28  07:41-21:45  10:06-22:47  05:01-09:11  05:06-13:47  11:02-16:53  16:57-19:58  12:17-20:43  07:11-07:12  22:33-22:45  19:53-20:58  08:40-10:56  18:23-18:58  08:55-09:58  18:23-18:58  01:39-15:48  02:10-19:24  05:06-13:47  02:15-02:53  14:42-18:52  04:10-22:41  21:09-22:23  22:24-23:58  18:23-18:58  06:50-15:56  05:16-07:27  14:47-20:50  09:51-18:52  12:31-19:51  13:51-13:52  19:58-21:59  22:24-23:58  07:26-23:30  21:09-22:23  08:40-10:56  15:17-22:18  07:06-20:28  15:03-22:54  04:25-20:50  23:29-23:47  08:55-09:58  09:21-21:54  23:29-23:47  22:53-22:54  12:31-19:51  22:39-23:41  05:16-07:27  19:58-21:59  07:11-07:12  06:45-11:46  15:03-22:54  19:43-22:48  13:51-13:52  17:33-22:45  00:05-05:07  03:44-06:54  07:26-23:30  09:31-16:41  16:57-19:58  11:41-14:45  07:06-20:28  00:54-13:57  05:16-07:27  17:28-21:54  20:23-21:45  07:21-18:40  18:03-23:19  20:23-21:45  22:24-23:58  02:15-02:53  17:42-20:58  21:58-23:59  00:49-07:58  20:34-23:55  16:37-18:45  12:37-22:44  09:31-16:41  18:18-23:34  17:42-20:58  07:21-18:40  17:48-22:54  23:19-23:24  12:31-19:51  05:54-23:57  21:58-23:59  10:06-22:47  20:23-21:45  18:23-18:58  08:55-09:58  10:27-10:42  01:39-15:48  03:05-10:27  16:52-17:55  03:35-13:41  02:15-02:53  00:49-07:58  09:36-20:58  04:10-22:41  12:22-23:31  15:03-22:54  14:27-18:43  19:43-22:48  19:43-22:48  22:44-23:54  17:33-22:45  05:54-23:57  18:03-23:19  10:06-22:47  11:46-17:56  16:57-19:58  11:02-16:53  23:58-23:59  21:19-21:49  08:46-14:52  11:41-14:45  12:17-20:43  23:14-23:37  23:29-23:47  19:38-20:53  14:47-20:50  21:48-21:54  04:10-22:41  16:57-19:58  17:28-21:54  05:06-13:47  07:26-23:30  22:53-22:54  07:06-20:28  17:28-21:54  09:36-20:58  02:10-19:24  21:09-22:23  10:27-10:42  00:49-07:58  03:44-06:54  20:13-23:20  03:44-06:54  06:35-17:49  16:52-17:55  20:34-23:55  09:51-18:52  03:05-10:27  17:28-21:54  20:28-22:35  22:33-22:45  12:31-19:51  16:37-18:45  00:54-13:57  15:03-22:54  00:49-07:58  05:06-13:47  09:16-17:28  20:23-21:45  15:23-15:45  22:44-23:54  03:05-10:27  08:16-12:43  01:24-17:37  21:09-22:23  09:16-17:28  00:49-07:58  10:06-22:47  10:27-10:42  19:58-21:59  13:57-16:58  07:41-21:45  18:03-23:19  19:38-20:53  16:52-17:55  08:16-12:43  08:40-10:56  21:09-22:23  17:28-21:54  16:52-17:55  22:44-23:54  12:31-19:51  22:33-22:45  07:21-18:40  06:45-11:46  17:42-20:58  13:57-16:58  14:47-20:50  20:34-23:55  21:09-22:23  08:01-13:32  03:44-06:54  12:37-22:44  17:13-21:48  06:35-17:49  04:10-22:41  17:28-21:54  06:50-15:56  13:57-16:58  06:45-11:46  19:53-20:58  22:53-22:54  10:27-10:42  15:17-22:18  23:19-23:24  08:40-10:56  04:20-15:25  02:30-22:58  19:53-20:58  01:34-09:55  15:17-22:18  18:47-18:50  21:19-21:49  21:19-21:49  21:09-22:23  09:21-21:54  15:23-15:45  00:05-05:07  18:47-18:50  03:35-13:41  13:07-13:15  03:50-11:53  18:03-23:19  05:06-13:47  21:48-21:54  09:21-21:54  05:54-23:57  23:58-23:59  17:33-22:45  10:51-23:56  13:57-16:58  19:38-20:53  07:21-18:40  22:33-22:45  14:47-20:50  23:58-23:59  19:53-20:58  00:05-05:07  00:49-07:58  08:55-09:58  23:14-23:37  16:57-19:58  06:45-11:46  18:09-19:53  17:42-20:58  00:05-05:07  23:14-23:37  14:27-18:43  01:34-09:55  20:23-21:45  06:35-17:49  22:53-22:54  22:53-22:54  09:31-16:41  10:27-10:42  20:34-23:55  14:42-18:52  21:09-22:23  04:20-15:25  00:49-07:58  20:34-23:55  21:09-22:23  07:06-20:28  07:11-07:12  04:25-20:50  18:47-18:50  05:16-07:27  09:36-20:58  23:19-23:24  21:19-21:49  19:58-21:59  02:10-19:24  10:06-22:47  15:23-15:45  09:51-18:52  01:39-15:48  08:55-09:58  17:42-20:58  23:14-23:37  14:32-21:35  21:58-23:59  08:16-12:43  09:16-17:28  21:19-21:49  08:46-14:52  20:34-23:55  02:15-02:53  08:40-10:56  05:54-23:57  22:44-23:54  14:47-20:50  14:32-21:35  19:53-20:58  10:51-23:56  04:10-22:41  19:53-20:58  08:01-13:32  15:23-15:45  01:34-09:55  21:04-21:40  23:19-23:24  18:09-19:53  08:55-09:58  21:04-21:40  17:13-21:48  15:17-22:18  11:56-13:57  11:02-16:53  17:28-21:54  19:38-20:53  11:46-17:56  14:47-20:50  08:46-14:52  06:35-17:49  02:00-04:46  05:06-13:47  22:44-23:54  15:17-22:18  09:16-17:28  12:22-23:31  21:04-21:40  19:43-22:48  03:50-11:53  18:23-18:58  23:19-23:24  03:35-13:41  00:05-05:07  22:24-23:58  09:21-21:54  13:07-13:15  10:27-10:42  21:04-21:40  02:00-04:46  19:58-21:59  19:43-22:48  07:21-18:40  23:29-23:47  05:01-09:11  02:15-02:53  16:37-18:45  08:46-14:52  19:43-22:48  08:01-13:32  14:47-20:50  21:48-21:54  17:48-22:54  16:37-18:45  05:06-13:47  01:39-15:48  16:52-17:55  01:39-15:48  03:35-13:41  16:57-19:58  05:01-09:11  10:51-23:56  03:44-06:54  14:27-18:43  18:03-23:19  02:15-02:53  18:09-19:53  19:43-22:48  22:24-23:58  00:49-07:58  21:09-22:23  14:42-18:52  01:34-09:55  11:56-13:57  06:35-17:49  15:23-15:45  06:30-12:58  06:45-11:46  16:52-17:55  06:50-15:56  10:27-10:42  03:44-06:54  18:09-19:53  10:51-23:56  17:33-22:45  07:26-23:30  23:19-23:24  21:48-21:54  11:46-17:56  02:15-02:53  16:37-18:45  16:57-19:58  05:01-09:11  22:53-22:54  14:47-20:50  19:58-21:59  16:08-17:35  15:03-22:54  15:17-22:18  08:16-12:43  12:37-22:44  01:24-17:37  20:13-23:20  18:03-23:19  15:23-15:45  11:56-13:57  07:06-20:28  05:01-09:11  03:50-11:53  01:34-09:55  05:01-09:11  09:16-17:28  08:55-09:58  02:15-02:53  23:19-23:24  13:07-13:15  09:31-16:41  03:44-06:54  01:24-17:37  04:25-20:50  19:43-22:48  20:28-22:35  07:06-20:28  13:57-16:58  18:03-23:19  15:03-22:54  02:30-22:58  20:28-22:35  01:39-15:48  16:08-17:35  10:06-22:47  19:58-21:59  19:58-21:59  13:07-13:15  11:02-16:53  07:11-07:12  23:19-23:24  11:56-13:57  23:58-23:59  17:28-21:54  10:12-11:30  17:28-21:54  11:46-17:56  21:04-21:40  07:06-20:28  06:30-12:58  07:11-07:12  08:16-12:43  15:23-15:45  00:49-07:58  09:36-20:58  23:14-23:37  18:09-19:53  15:23-15:45  11:41-14:45  15:17-22:18  17:28-21:54  00:05-05:07  17:48-22:54  10:12-11:30  02:15-02:53  04:25-20:50  09:51-18:52  22:33-22:45  19:58-21:59  14:32-21:35  18:47-18:50  23:19-23:24  08:01-13:32  02:00-04:46  18:18-23:34  03:05-10:27  08:16-12:43  07:06-20:28  22:44-23:54  01:24-17:37  13:12-15:47  14:32-21:35  17:42-20:58  11:41-14:45  01:39-15:48  22:44-23:54  22:53-22:54  23:58-23:59  23:19-23:24  04:40-18:55  23:58-23:59  03:44-06:54  01:34-09:55  06:35-17:49  13:51-13:52  22:24-23:58  11:56-13:57  06:35-17:49  08:01-13:32  16:37-18:45  13:07-13:15  00:05-05:07  19:53-20:58  21:04-21:40  10:51-23:56  12:22-23:31  22:24-23:58  23:14-23:37  11:02-16:53  11:02-16:53  20:28-22:35  10:12-11:30  21:09-22:23  14:47-20:50  06:35-17:49  07:26-23:30  17:13-21:48  16:57-19:58 | 36 |
| **Вход** | **Изход** |
| 10:00-10:00  903  02:10-19:24  01:39-15:48  22:53-22:54  21:09-22:23  09:21-21:54  13:57-16:58  13:51-13:52  08:46-14:52  10:06-22:47  22:33-22:45  04:20-15:25  11:02-16:53  15:03-22:54  13:07-13:15  12:37-22:44  15:17-22:18  03:44-06:54  03:44-06:54  15:17-22:18  18:47-18:50  09:16-17:28  22:39-23:41  11:46-17:56  01:24-17:37  09:16-17:28  00:49-07:58  01:24-17:37  19:38-20:53  23:14-23:37  17:13-21:48  19:53-20:58  00:05-05:07  17:13-21:48  18:23-18:58  01:34-09:55  01:24-17:37  12:22-23:31  12:31-19:51  05:01-09:11  19:53-20:58  12:22-23:31  10:27-10:42  02:00-04:46  06:35-17:49  05:54-23:57  15:23-15:45  08:16-12:43  19:58-21:59  20:34-23:55  10:06-22:47  23:14-23:37  08:40-10:56  14:27-18:43  07:41-21:45  08:16-12:43  21:19-21:49  18:23-18:58  07:21-18:40  22:44-23:54  08:40-10:56  11:41-14:45  11:02-16:53  20:23-21:45  15:03-22:54  20:28-22:35  21:04-21:40  04:40-18:55  14:27-18:43  22:24-23:58  09:21-21:54  19:43-22:48  08:01-13:32  14:32-21:35  13:12-15:47  11:56-13:57  16:37-18:45  06:30-12:58  04:20-15:25  19:38-20:53  22:24-23:58  21:04-21:40  11:56-13:57  03:35-13:41  23:58-23:59  23:29-23:47  21:04-21:40  20:28-22:35  15:03-22:54  21:58-23:59  08:46-14:52  12:31-19:51  16:52-17:55  18:18-23:34  07:11-07:12  18:03-23:19  06:50-15:56  00:54-13:57  21:48-21:54  21:58-23:59  01:39-15:48  22:33-22:45  16:57-19:58  19:43-22:48  09:21-21:54  07:11-07:12  08:01-13:32  11:56-13:57  18:03-23:19  19:53-20:58  14:47-20:50  01:39-15:48  13:12-15:47  10:51-23:56  23:29-23:47  04:25-20:50  05:16-07:27  06:35-17:49  13:12-15:47  09:21-21:54  22:33-22:45  05:06-13:47  11:46-17:56  04:20-15:25  07:26-23:30  08:40-10:56  14:42-18:52  13:51-13:52  17:13-21:48  05:01-09:11  22:53-22:54  09:31-16:41  02:30-22:58  17:13-21:48  11:46-17:56  23:58-23:59  09:36-20:58  08:01-13:32  11:02-16:53  09:36-20:58  08:16-12:43  21:58-23:59  01:34-09:55  13:57-16:58  23:58-23:59  12:37-22:44  16:08-17:35  04:10-22:41  23:19-23:24  20:34-23:55  06:35-17:49  22:24-23:58  10:51-23:56  05:16-07:27  22:33-22:45  00:05-05:07  03:35-13:41  23:29-23:47  05:06-13:47  00:49-07:58  16:37-18:45  05:01-09:11  16:52-17:55  17:33-22:45  02:30-22:58  04:25-20:50  16:57-19:58  18:09-19:53  16:52-17:55  22:39-23:41  23:19-23:24  07:06-20:28  00:05-05:07  14:27-18:43  06:35-17:49  05:06-13:47  04:40-18:55  08:40-10:56  21:09-22:23  23:19-23:24  09:21-21:54  20:23-21:45  18:03-23:19  02:10-19:24  22:33-22:45  09:21-21:54  09:31-16:41  07:06-20:28  06:30-12:58  22:33-22:45  00:54-13:57  21:58-23:59  19:43-22:48  09:21-21:54  03:50-11:53  13:07-13:15  09:36-20:58  12:31-19:51  05:16-07:27  00:05-05:07  18:47-18:50  02:30-22:58  05:06-13:47  00:49-07:58  07:06-20:28  09:21-21:54  03:50-11:53  00:54-13:57  09:31-16:41  09:16-17:28  13:12-15:47  18:03-23:19  06:50-15:56  16:37-18:45  19:58-21:59  07:06-20:28  21:48-21:54  01:34-09:55  18:09-19:53  15:17-22:18  06:45-11:46  19:43-22:48  23:29-23:47  04:10-22:41  02:15-02:53  02:30-22:58  04:10-22:41  13:51-13:52  16:08-17:35  16:37-18:45  07:21-18:40  02:00-04:46  20:13-23:20  08:55-09:58  04:40-18:55  12:22-23:31  07:06-20:28  11:02-16:53  17:13-21:48  17:42-20:58  11:02-16:53  01:24-17:37  03:05-10:27  20:23-21:45  13:51-13:52  05:01-09:11  19:38-20:53  13:57-16:58  19:53-20:58  19:53-20:58  14:27-18:43  19:53-20:58  10:12-11:30  00:49-07:58  17:28-21:54  03:35-13:41  02:10-19:24  11:46-17:56  15:23-15:45  22:24-23:58  04:20-15:25  13:07-13:15  19:38-20:53  15:03-22:54  07:26-23:30  09:21-21:54  21:58-23:59  21:04-21:40  06:45-11:46  06:45-11:46  10:51-23:56  03:35-13:41  06:30-12:58  01:34-09:55  08:46-14:52  21:09-22:23  10:27-10:42  02:15-02:53  02:10-19:24  20:23-21:45  17:42-20:58  08:01-13:32  23:29-23:47  20:23-21:45  19:58-21:59  16:57-19:58  21:19-21:49  00:54-13:57  08:16-12:43  11:56-13:57  09:21-21:54  13:07-13:15  18:47-18:50  12:37-22:44  12:31-19:51  21:04-21:40  16:37-18:45  10:12-11:30  17:28-21:54  21:19-21:49  19:53-20:58  15:23-15:45  18:03-23:19  12:17-20:43  19:53-20:58  15:23-15:45  12:31-19:51  08:46-14:52  20:34-23:55  13:07-13:15  11:56-13:57  04:25-20:50  20:28-22:35  06:50-15:56  10:12-11:30  13:07-13:15  18:09-19:53  22:24-23:58  13:51-13:52  08:16-12:43  06:50-15:56  01:34-09:55  18:18-23:34  12:37-22:44  00:54-13:57  14:32-21:35  08:55-09:58  11:41-14:45  17:33-22:45  10:51-23:56  15:23-15:45  10:06-22:47  08:55-09:58  22:39-23:41  05:01-09:11  06:50-15:56  00:49-07:58  09:21-21:54  05:01-09:11  14:27-18:43  03:35-13:41  22:24-23:58  21:09-22:23  18:18-23:34  17:48-22:54  10:27-10:42  21:09-22:23  17:28-21:54  12:17-20:43  22:33-22:45  07:26-23:30  11:02-16:53  07:11-07:12  02:00-04:46  19:58-21:59  04:10-22:41  20:13-23:20  23:14-23:37  16:52-17:55  21:09-22:23  06:35-17:49  11:41-14:45  19:43-22:48  20:34-23:55  02:15-02:53  11:41-14:45  19:38-20:53  21:58-23:59  23:58-23:59  21:09-22:23  17:48-22:54  08:55-09:58  22:53-22:54  22:33-22:45  14:32-21:35  18:18-23:34  20:13-23:20  10:51-23:56  23:19-23:24  08:16-12:43  10:12-11:30  08:16-12:43  22:33-22:45  18:09-19:53  08:55-09:58  09:51-18:52  19:43-22:48  10:27-10:42  07:11-07:12  11:41-14:45  08:46-14:52  18:23-18:58  04:20-15:25  01:39-15:48  01:39-15:48  03:44-06:54  20:28-22:35  05:06-13:47  20:34-23:55  05:16-07:27  01:39-15:48  11:02-16:53  04:20-15:25  19:38-20:53  09:16-17:28  22:39-23:41  12:17-20:43  08:46-14:52  16:57-19:58  00:49-07:58  07:06-20:28  20:13-23:20  04:25-20:50  13:07-13:15  21:48-21:54  03:50-11:53  12:17-20:43  18:23-18:58  23:29-23:47  22:53-22:54  08:46-14:52  14:42-18:52  18:18-23:34  17:48-22:54  12:31-19:51  22:33-22:45  14:27-18:43  20:23-21:45  14:42-18:52  22:39-23:41  21:58-23:59  08:55-09:58  07:06-20:28  17:13-21:48  06:45-11:46  04:40-18:55  14:47-20:50  07:26-23:30  19:43-22:48  03:05-10:27  19:43-22:48  21:48-21:54  16:37-18:45  17:13-21:48  03:44-06:54  22:24-23:58  00:49-07:58  19:43-22:48  14:42-18:52  08:40-10:56  08:16-12:43  06:35-17:49  17:28-21:54  21:48-21:54  07:21-18:40  21:48-21:54  03:35-13:41  15:03-22:54  00:54-13:57  10:51-23:56  07:21-18:40  15:03-22:54  17:13-21:48  04:10-22:41  02:00-04:46  04:40-18:55  12:17-20:43  21:04-21:40  06:30-12:58  22:39-23:41  06:50-15:56  22:39-23:41  09:31-16:41  13:12-15:47  19:58-21:59  21:48-21:54  20:13-23:20  11:56-13:57  13:12-15:47  23:58-23:59  02:15-02:53  23:14-23:37  10:12-11:30  16:52-17:55  07:11-07:12  19:53-20:58  19:58-21:59  14:47-20:50  15:23-15:45  18:47-18:50  11:56-13:57  09:36-20:58  11:02-16:53  08:01-13:32  19:53-20:58  03:50-11:53  03:44-06:54  16:57-19:58  08:01-13:32  03:35-13:41  09:16-17:28  08:16-12:43  12:22-23:31  09:51-18:52  07:21-18:40  08:46-14:52  20:13-23:20  21:04-21:40  19:38-20:53  08:40-10:56  05:06-13:47  10:27-10:42  19:38-20:53  00:05-05:07  13:07-13:15  12:37-22:44  09:21-21:54  06:50-15:56  14:47-20:50  12:37-22:44  02:30-22:58  02:00-04:46  23:29-23:47  22:33-22:45  22:33-22:45  07:06-20:28  16:08-17:35  05:01-09:11  17:28-21:54  02:00-04:46  05:54-23:57  21:04-21:40  19:43-22:48  20:28-22:35  01:34-09:55  11:46-17:56  04:40-18:55  06:50-15:56  20:23-21:45  22:33-22:45  09:31-16:41  21:04-21:40  18:18-23:34  06:50-15:56  06:30-12:58  18:18-23:34  13:07-13:15  21:48-21:54  06:45-11:46  11:46-17:56  04:20-15:25  14:42-18:52  19:58-21:59  00:54-13:57  19:53-20:58  00:05-05:07  08:55-09:58  13:57-16:58  21:09-22:23  22:24-23:58  21:09-22:23  19:43-22:48  03:44-06:54  21:09-22:23  08:16-12:43  07:11-07:12  01:34-09:55  04:40-18:55  22:39-23:41  18:09-19:53  07:06-20:28  21:19-21:49  21:19-21:49  03:05-10:27  02:15-02:53  15:17-22:18  13:12-15:47  21:09-22:23  09:51-18:52  08:46-14:52  11:46-17:56  04:10-22:41  22:24-23:58  10:12-11:30  09:31-16:41  08:01-13:32  06:35-17:49  23:19-23:24  05:06-13:47  18:18-23:34  14:42-18:52  01:34-09:55  02:30-22:58  14:47-20:50  05:54-23:57  06:35-17:49  17:28-21:54  13:57-16:58  03:05-10:27  03:50-11:53  16:52-17:55  13:57-16:58  16:57-19:58  04:25-20:50  03:50-11:53  00:49-07:58  22:53-22:54  03:44-06:54  21:48-21:54  03:44-06:54  15:23-15:45  15:17-22:18  22:53-22:54  23:14-23:37  04:25-20:50  03:50-11:53  20:28-22:35  09:21-21:54  23:29-23:47  10:06-22:47  18:23-18:58  18:03-23:19  03:05-10:27  09:51-18:52  15:17-22:18  11:02-16:53  12:37-22:44  23:19-23:24  08:01-13:32  18:47-18:50  21:58-23:59  22:24-23:58  17:13-21:48  16:52-17:55  15:03-22:54  08:40-10:56  05:01-09:11  11:46-17:56  17:13-21:48  02:30-22:58  09:16-17:28  02:00-04:46  01:39-15:48  02:30-22:58  19:43-22:48  22:33-22:45  20:28-22:35  13:07-13:15  20:13-23:20  19:53-20:58  21:58-23:59  00:54-13:57  19:58-21:59  03:50-11:53  02:15-02:53  21:58-23:59  15:23-15:45  12:37-22:44  23:58-23:59  21:19-21:49  05:01-09:11  15:23-15:45  12:31-19:51  02:10-19:24  16:37-18:45  03:50-11:53  20:13-23:20  16:52-17:55  07:21-18:40  06:35-17:49  21:58-23:59  02:30-22:58  02:00-04:46  14:47-20:50  23:58-23:59  14:32-21:35  22:53-22:54  05:06-13:47  12:17-20:43  16:52-17:55  14:42-18:52  09:21-21:54  13:57-16:58  12:17-20:43  08:40-10:56  13:51-13:52  20:13-23:20  19:53-20:58  07:26-23:30  17:13-21:48  10:06-22:47  22:53-22:54  11:56-13:57  01:24-17:37  19:38-20:53  22:24-23:58  19:58-21:59  22:39-23:41  08:01-13:32  03:44-06:54  06:50-15:56  03:44-06:54  16:37-18:45  07:26-23:30  08:46-14:52  12:17-20:43  08:46-14:52  04:20-15:25  02:00-04:46  10:51-23:56  03:35-13:41  14:47-20:50  23:29-23:47  12:37-22:44  06:45-11:46  06:30-12:58  01:34-09:55  10:06-22:47  04:20-15:25  20:34-23:55  06:45-11:46  18:09-19:53  13:57-16:58  23:58-23:59  19:38-20:53  16:52-17:55  14:42-18:52  05:06-13:47  05:01-09:11  05:06-13:47  00:05-05:07  22:24-23:58  20:13-23:20  08:40-10:56  03:50-11:53  10:06-22:47  03:35-13:41  23:19-23:24  21:19-21:49  13:12-15:47  09:36-20:58  03:44-06:54  03:44-06:54  19:43-22:48  18:09-19:53  00:49-07:58  22:33-22:45  03:50-11:53  18:47-18:50  23:58-23:59  21:58-23:59  08:01-13:32  04:10-22:41  16:57-19:58  14:47-20:50  22:33-22:45  18:18-23:34  10:27-10:42  22:39-23:41  15:03-22:54  03:05-10:27  20:28-22:35  03:50-11:53  01:24-17:37  03:35-13:41  15:03-22:54  04:25-20:50  01:39-15:48  19:38-20:53  18:47-18:50  07:26-23:30  06:45-11:46  06:35-17:49  08:55-09:58  21:48-21:54  13:51-13:52  02:15-02:53  11:02-16:53  09:21-21:54  12:37-22:44  17:28-21:54  15:23-15:45  21:09-22:23  04:10-22:41  19:58-21:59  20:34-23:55  11:02-16:53  21:04-21:40  22:24-23:58  16:08-17:35  21:19-21:49  11:56-13:57  12:31-19:51  04:25-20:50  21:58-23:59  12:17-20:43  17:42-20:58  18:09-19:53  15:17-22:18  02:15-02:53  00:54-13:57  01:24-17:37  07:21-18:40  17:48-22:54  21:04-21:40  19:43-22:48  12:17-20:43  20:23-21:45  05:01-09:11  11:46-17:56  13:07-13:15  00:05-05:07  11:56-13:57  03:50-11:53  03:05-10:27  10:51-23:56  03:50-11:53  21:48-21:54  11:56-13:57  12:31-19:51  21:48-21:54  06:30-12:58  01:24-17:37  08:01-13:32  02:00-04:46  07:21-18:40  11:02-16:53  19:58-21:59  21:48-21:54  08:40-10:56  13:57-16:58  00:54-13:57  19:53-20:58  00:54-13:57  22:33-22:45  20:34-23:55  07:11-07:12  21:09-22:23  12:37-22:44  10:06-22:47  18:09-19:53  02:30-22:58  20:34-23:55  16:08-17:35  02:10-19:24  20:23-21:45  17:48-22:54  02:30-22:58  06:50-15:56  09:16-17:28  02:15-02:53  06:45-11:46  18:03-23:19  08:16-12:43  15:17-22:18  17:33-22:45  17:48-22:54  03:50-11:53  01:39-15:48  13:51-13:52  02:30-22:58  10:06-22:47  15:23-15:45  20:28-22:35  21:58-23:59  17:42-20:58  04:20-15:25  14:32-21:35  16:08-17:35  23:19-23:24  07:11-07:12  10:12-11:30  02:00-04:46  23:58-23:59  22:53-22:54  13:07-13:15  03:44-06:54  14:47-20:50  05:01-09:11  06:45-11:46  07:21-18:40  20:23-21:45  12:17-20:43  22:24-23:58  23:14-23:37  18:03-23:19  05:01-09:11  16:08-17:35  08:46-14:52  21:48-21:54  20:34-23:55  21:09-22:23  19:38-20:53  22:53-22:54  13:07-13:15  07:11-07:12  09:16-17:28  11:56-13:57  18:18-23:34  02:15-02:53  09:51-18:52  13:07-13:15  20:13-23:20  23:19-23:24 | 0 |
| **Вход** | **Изход** |
| 14:32-21:35  1000  19:43-22:48  06:35-17:49  19:58-21:59  14:42-18:52  10:27-10:42  04:25-20:50  04:20-15:25  00:05-05:07  06:30-12:58  09:31-16:41  06:35-17:49  17:33-22:45  11:41-14:45  04:40-18:55  00:05-05:07  01:34-09:55  07:06-20:28  10:12-11:30  20:34-23:55  19:43-22:48  11:46-17:56  01:34-09:55  09:21-21:54  17:28-21:54  16:57-19:58  17:28-21:54  01:24-17:37  09:36-20:58  11:41-14:45  23:19-23:24  06:35-17:49  01:24-17:37  22:39-23:41  22:24-23:58  04:40-18:55  19:58-21:59  14:42-18:52  15:17-22:18  22:53-22:54  07:11-07:12  03:44-06:54  19:58-21:59  05:06-13:47  21:19-21:49  16:37-18:45  21:04-21:40  18:23-18:58  08:46-14:52  03:44-06:54  09:36-20:58  23:58-23:59  09:16-17:28  11:46-17:56  15:23-15:45  20:34-23:55  18:18-23:34  07:06-20:28  12:22-23:31  02:15-02:53  03:50-11:53  02:10-19:24  23:14-23:37  23:14-23:37  23:58-23:59  07:26-23:30  15:03-22:54  06:45-11:46  05:06-13:47  10:51-23:56  09:36-20:58  15:23-15:45  09:36-20:58  05:06-13:47  23:14-23:37  16:08-17:35  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09:21-21:54  08:46-14:52  02:10-19:24  22:53-22:54  00:54-13:57  13:51-13:52  13:57-16:58  16:37-18:45  21:58-23:59  05:16-07:27  17:48-22:54  21:48-21:54  16:52-17:55  08:40-10:56  10:27-10:42  03:35-13:41  23:14-23:37  16:57-19:58  10:51-23:56  11:46-17:56  13:07-13:15  14:27-18:43  08:55-09:58  07:26-23:30  09:21-21:54  21:48-21:54  18:18-23:34  18:18-23:34  03:05-10:27  14:27-18:43  17:13-21:48  22:53-22:54  15:23-15:45  10:51-23:56  06:35-17:49  10:06-22:47  16:37-18:45  08:16-12:43  20:23-21:45  20:13-23:20  07:11-07:12  09:16-17:28  16:37-18:45  04:10-22:41  04:10-22:41  20:13-23:20  13:07-13:15  09:21-21:54  10:12-11:30  14:27-18:43  14:42-18:52  15:17-22:18  03:35-13:41  00:54-13:57  12:31-19:51  18:03-23:19  11:41-14:45  23:14-23:37  22:24-23:58  02:15-02:53  12:22-23:31  06:30-12:58  18:03-23:19  23:19-23:24  22:53-22:54  06:45-11:46  23:14-23:37  04:10-22:41  06:35-17:49  10:12-11:30  21:48-21:54  20:28-22:35  07:26-23:30  18:09-19:53  14:27-18:43  02:00-04:46  08:40-10:56  08:16-12:43  13:07-13:15  12:17-20:43  13:12-15:47  18:47-18:50  00:54-13:57  11:46-17:56  17:33-22:45  19:43-22:48  17:28-21:54  19:58-21:59  16:08-17:35  22:24-23:58  22:33-22:45  22:53-22:54  08:01-13:32  11:56-13:57  01:39-15:48  12:31-19:51  19:43-22:48  10:06-22:47  00:05-05:07  22:33-22:45  02:30-22:58  07:06-20:28  20:34-23:55  10:51-23:56  10:27-10:42  22:44-23:54  01:39-15:48  13:57-16:58  21:19-21:49  08:40-10:56  09:31-16:41  20:13-23:20  09:16-17:28  21:58-23:59  17:33-22:45  04:25-20:50  22:24-23:58  00:05-05:07  05:54-23:57  19:58-21:59  05:06-13:47  08:46-14:52  06:50-15:56  18:03-23:19  11:46-17:56  04:25-20:50  16:57-19:58  07:21-18:40  04:20-15:25  19:43-22:48  11:46-17:56  15:23-15:45  07:21-18:40  14:42-18:52  15:17-22:18  05:16-07:27  15:03-22:54  13:12-15:47  06:50-15:56  23:19-23:24  05:54-23:57  08:01-13:32  21:48-21:54  06:35-17:49  07:41-21:45  18:09-19:53  11:46-17:56  10:12-11:30  10:12-11:30  20:23-21:45  12:17-20:43  18:47-18:50  15:03-22:54  22:53-22:54  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11:02-16:53  19:43-22:48  02:10-19:24  07:41-21:45  05:16-07:27  03:05-10:27  21:04-21:40  12:31-19:51  15:17-22:18  03:05-10:27  23:29-23:47  17:42-20:58  18:47-18:50  22:44-23:54  09:51-18:52  10:06-22:47  12:17-20:43  11:56-13:57  07:26-23:30  12:17-20:43  02:00-04:46  03:50-11:53  16:52-17:55  17:28-21:54  10:27-10:42  20:34-23:55  22:24-23:58  01:24-17:37  14:47-20:50  07:21-18:40  17:33-22:45  23:58-23:59  02:00-04:46  19:38-20:53  18:23-18:58  20:34-23:55  02:10-19:24  18:03-23:19  05:54-23:57  16:57-19:58  00:49-07:58  09:36-20:58  18:18-23:34  10:06-22:47  21:19-21:49  17:48-22:54  12:22-23:31  02:10-19:24  13:57-16:58  07:06-20:28  16:08-17:35  22:39-23:41  06:30-12:58  17:13-21:48  04:25-20:50  18:03-23:19  02:00-04:46  02:30-22:58  07:06-20:28  13:12-15:47  03:50-11:53  18:47-18:50  14:32-21:35  07:06-20:28  08:40-10:56  09:21-21:54  13:51-13:52  04:40-18:55  21:09-22:23  17:48-22:54  07:06-20:28  22:44-23:54  16:52-17:55  19:58-21:59  05:16-07:27  22:53-22:54  20:23-21:45  16:37-18:45  01:39-15:48  10:27-10:42  18:03-23:19  20:23-21:45  16:57-19:58  17:33-22:45  08:01-13:32  06:45-11:46  04:20-15:25  19:38-20:53  19:43-22:48  10:12-11:30  17:42-20:58  04:10-22:41  21:48-21:54  20:13-23:20  12:17-20:43  16:52-17:55  05:54-23:57  09:21-21:54  01:34-09:55  10:06-22:47  03:05-10:27  02:30-22:58  21:48-21:54  01:39-15:48  17:48-22:54  22:53-22:54  16:37-18:45  04:20-15:25  06:45-11:46  11:02-16:53  21:48-21:54  20:13-23:20  11:41-14:45  14:27-18:43  05:01-09:11  06:35-17:49  07:21-18:40  14:47-20:50  16:52-17:55  07:26-23:30  16:52-17:55  22:44-23:54  18:47-18:50  21:48-21:54  23:14-23:37  07:26-23:30  11:46-17:56  18:47-18:50  06:50-15:56  23:14-23:37  16:08-17:35  14:32-21:35  20:34-23:55  14:42-18:52  06:30-12:58  09:21-21:54  15:23-15:45  14:27-18:43  05:16-07:27  21:58-23:59  23:58-23:59  17:48-22:54  07:41-21:45  02:30-22:58  23:14-23:37  07:21-18:40  16:37-18:45  06:30-12:58  19:43-22:48  23:29-23:47  08:40-10:56  08:55-09:58  16:37-18:45  11:56-13:57  22:44-23:54  09:51-18:52  17:33-22:45  10:51-23:56  01:34-09:55  20:13-23:20  21:58-23:59  21:58-23:59  15:17-22:18  11:02-16:53  18:03-23:19  11:46-17:56  04:10-22:41  14:47-20:50  07:06-20:28  18:47-18:50  08:01-13:32  15:03-22:54  20:23-21:45  18:03-23:19  06:35-17:49  03:35-13:41  20:34-23:55  10:06-22:47  15:23-15:45  03:44-06:54  13:57-16:58  04:25-20:50  03:35-13:41  17:13-21:48  14:42-18:52  18:03-23:19  21:04-21:40  08:46-14:52  20:28-22:35  02:10-19:24  09:36-20:58  15:23-15:45  07:41-21:45  07:11-07:12  10:51-23:56  02:10-19:24  01:39-15:48  06:30-12:58  18:18-23:34  05:16-07:27  19:58-21:59  19:38-20:53  09:16-17:28  00:05-05:07  08:16-12:43  21:09-22:23  11:41-14:45  15:23-15:45  21:09-22:23  18:18-23:34  17:48-22:54  18:18-23:34  12:17-20:43  08:40-10:56  00:05-05:07  09:21-21:54  22:53-22:54  08:55-09:58  20:28-22:35  17:48-22:54  01:34-09:55  13:12-15:47  04:10-22:41  10:27-10:42  02:00-04:46  21:09-22:23  13:51-13:52  17:42-20:58  18:03-23:19  15:17-22:18  07:26-23:30  13:12-15:47 | 137 |
| Задача 13. Щастливи подредици | |
| **Условие**  \* Дадена е редица P с цели числа (1 < P < 100 000) и число N. Щастлива под-редица в редицата P наричаме всяка съвкупност, състояща се от последо­вателни числа от P, чиято сума е N. Да си представим, че имаме редицата S, състояща се от всички щастливи под-редици в P, подредени в намаляващ ред спрямо дължината им. Напишете програма, която извежда първите 10 елемента на S, като елементите могат да се повтарят и трябва да са изведени в намаляващ ред според дължината си. Ако две или повече редици имат равни дължини, трябва да са сортирани в намаляващ ред по първия, втория, третия и т.н. елемент.  Пример: Имаме N=5 и редицата P={1, 1, 2, 1, -1, 2, 3, -1, 1, 2, 3, 5, 1, -1, 2, 3}. Редицата S се състои от следните 13 под-редици на P:   * **[1, -1, 2, 3, -1, 1]** * **[1, 2, 1, -1, 2]** * **[3, -1, 1, 2]** * **[2, 3, -1, 1]** * **[1, 1, 2, 1]** * **[1, -1, 2, 3]** * **[1, -1, 2, 3]** * **[-1, 1, 2, 3]** * **[5, 1, -1]** * **[2, 3]** * [2, 3] * [2, 3] * [5]   Първите 10 елемента на P са дадени с удебелен шрифт. | |
| **Описание на входа**  На първия ред е дадено числото N (N може да е между 0 и 100000). На втория ред е дадена редица от числа, разделени с интервал. Всяко число може да е между -100000 и 100000. | |
| **Описание на изхода**  На 10 реда са изведени първите 10 елемента на S като последователности от числа, разделени с интервал. Редиците трябва да са сортирани по дължина в намаляващ ред, като ако има редици с равни дължини, те трябва да са сортирани поелементно в намаляващ ред. | |
| **Анализ на задачата**  Първата идея за решаване на задачата е проста: с два вложени цикъла намираме всички щастливи под-редици на редицата P, след което ги сортираме по дължината им и накрая извеждаме първите 10. Това, обаче няма да работи добре, ако броят щастливи под-редици са десетки милиони.  Ще опишем една идея за по-ефективно решение. Ще използваме класа TreeMultiSet<T>. В него ще съхраняваме първите 10 под-редици от S, т.е. мулти-множество от щастливите под-редици на P, подредени по дължина в намаляващ ред. Когато имаме 10 под-редици в мулти-множеството и добавим нова 11-та под-редица, тя ще застане на мястото си заради Comparer-а, който сме дефинирали. След това можем веднага да изтрием последната под-редица от мулти-множеството, защото тя не е сред първите 10. Така във всеки един момент ще пазим текущите 10 най-дълги под-редици. По този начин ще консумираме много по-малко памет и ще избегнем сортирането накрая. Имплементацията няма да е лесна, така че отделете достатъчно време!  Напишете Comparer за редиците, като ги сравнявате по дължина. Ако имаме 2 редици A и B съответно с дължини l и m, ако l > m, тогава връщайте -1, за да могат да се съхраняват елементите в обекта от тип TreeMultiSet<T> в намаляващ ред. Ако l < m, връщайте 1. Ако дължините на редиците са равни, започнете да сравнявате редиците поелементно. Ако сме стигнали до елементите с индекс i и всички елементи от A[0] до A[i - 1] са съответно равни на елементите от B[0] до B[i - 1], ако A[i] и B[i] са равни, продължаваме със следващите елементи от редиците. В противенс случай връщаме -A[i].CompareTo(B[i]), за да може елементите на множеството да са сортираани в намаляващ ред по елементите си.  Не забравяйте, че когато принтирате редиците, те трябва да се изведат толкова пъти, колкото се повтарят. Това може да се постигне чрез foreach – за всеки елемент в множеството го извеждате на нов ред толкова пъти, колкото се съдържа.  Имайте предвид, че при изтриването на най-малкия елемент на множеството, намалявате броя на повторенията, а не триете елемента заедно с повторенията, тъй като те може да участват в крайния резултат. Следователно, когато триете най-малия елемент, ако той се среща в множеството 1 път, триете цялата двойка KayValuePair<List<int>, int>. Иначе, намалявате броя на срещанията. | |
| **Решение (сорс код)** | |
| using System;  using System.Collections.Generic;  using System.Collections;  class TreeMultiSet<T> : IEnumerable<KeyValuePair<T, int>> where T : IList  {  private SortedDictionary<T, int> container;  public int Count  {  get  {  int count = container.Count;  return count;  }  }  public TreeMultiSet()  {  this.container = new SortedDictionary<T, int>();  }  public TreeMultiSet(IComparer<T> comparer)  {  this.container = new SortedDictionary<T, int>(comparer);  }  public void Add(T element)  {  int count;  bool containsElement = this.container.TryGetValue(element, out count);  if (containsElement)  {  count++;  }  else  {  count = 1;  }  this.container[element] = count;  }  public int CountOf(T element)  {  int count;  bool containsElement = this.container.TryGetValue(element, out count);  if (!containsElement)  {  count = 0;  }  return count;  }  public bool Remove(T element)  {  bool result = this.container.Remove(element);  return result;  }  public T SmallestElement()  {  T result = default(T);  foreach (var item in container)  {  result = item.Key;  break;  }  return result;  }  public T LargestElement()  {  T result = default(T);  foreach (var item in container)  {  result = item.Key;  }  return result;  }  public bool RemoveSmallestElement()  {  T elementToRemove = this.SmallestElement();  bool result = this.container.Remove(elementToRemove);  return result;  }  public bool RemoveLargestElement()  {  T elementToRemove = this.LargestElement();  int elementToRemoveCount = this.container[elementToRemove];  bool result;  if (elementToRemoveCount == 1)  {  result = this.container.Remove(elementToRemove);  }  else  {  int newCount = elementToRemoveCount - 1;  this.container[elementToRemove] = newCount;  return true;  }  return result;  }  IEnumerator<KeyValuePair<T, int>> IEnumerable<KeyValuePair<T, int>>.GetEnumerator()  {  foreach (KeyValuePair<T, int> entry in this.container)  {  yield return entry;  }  }  IEnumerator IEnumerable.GetEnumerator()  {  return ((IEnumerable<KeyValuePair<T, int>>)this).GetEnumerator();  }  public int AllEmentsCount()  {  int count = 0;  foreach (var item in this.container)  {  count += item.Value;  }  return count;  }  }  class CommandExecutor  {  static void Main(string[] args)  {  string numberInput = Console.ReadLine();  int number = int.Parse(numberInput);  string inputLine = Console.ReadLine();  string[] tokens = inputLine.Split(' ');  int[] array = new int[tokens.Length];  for (int i = 0; i < array.Length; i++)  {  array[i] = int.Parse(tokens[i]);  }  Comparer<List<int>, int> comparer = new Comparer<List<int>, int>();  TreeMultiSet<List<int>> set = new TreeMultiSet<List<int>>(comparer);  FindHappySequences(array, number, set);  PrintHappySubsets(set);  }  private static void PrintHappySubsets(TreeMultiSet<List<int>> set)  {  foreach (var subset in set)  {  for (int i = 0; i < subset.Value; i++)  {  foreach (var element in subset.Key)  {  Console.Write("{0} ", element);  }  if (i < subset.Value - 1)  {  Console.WriteLine();  }  }  Console.WriteLine();  }  }  private static void FindHappySequences(int[] array, int number, TreeMultiSet<List<int>> set)  {  for (int startIndex = 0; startIndex < array.Length; startIndex++)  {  int currentSum = 0;  List<int> newSequence = new List<int>();  for (int endIndex = startIndex; endIndex < array.Length; endIndex++)  {  int newElement = array[endIndex];  currentSum += newElement;  newSequence.Add(newElement);  if (currentSum == number)  {  List<int> happySequence = new List<int>(newSequence);  set.Add(happySequence);  if (set.AllEmentsCount() == 11)  {  set.RemoveLargestElement();  }  }  }  }  }  }  public class Comparer<T, K> : IComparer<T>  where T : IList<K>  where K : IComparable  {  public int Compare(T x, T y)  {  if (x.Count == y.Count)  {  for (int index = 0; index < x.Count; index++)  {  if (x[index].CompareTo(y[index]) > 0)  {  return -1;  }  else if (x[index].CompareTo(y[index]) < 0)  {  return 1;  }  }  return 0;  }  else  {  int result = -x.Count.CompareTo(y.Count);  return result;  }  }  } | |
| **Тестове**  Интересните случаи за тестване са следните:   * Примерният вход от условието на задачата * Ендо единствено число в редицатам, което да е равно на исканата сума * Ендо единствено число в редицатам, което да е различно от исканата сума * Редицата не съдържа числа, чиято сума да дава търсената | |
| **Вход** | **Изход** |
| 5  1 1 2 1 -1 2 3 -1 1 2 3 5 1 -1 2 3 | **1 -1 2 3 -1 1**  **1 2 1 -1 2**  **3 -1 1 2**  **2 3 -1 1**  **1 1 2 1**  **1 -1 2 3**  **1 -1 2 3**  **-1 1 2 3**  **5 1 -1**  **2 3** |
| **Вход** | **Изход** |
| **1**  **1** | **1** |
| **Вход** | **Изход** |
| **1**  **5** | **(празен низ)** |
| **Вход** | **Изход** |
| **5**  **1 3 2 1 -1 2 1 -1 1 2 3 5 1 -1 2 2 -1 5 -5 2 -2 1 -1 2** | **1 -1 2 2 -1 5 -5 2 -2 1 -1 2**  **2 2 -1 5 -5 2 -2 1 -1 2**  **1 -1 2 2 -1 5 -5 2**  **2 1 -1 2 1 -1 1**  **1 -1 2 1 -1 1 2**  **2 2 -1 5 -5 2**  **2 1 -1 2 1**  **2 1 -1 1 2**  **3 2 1 -1**  **-1 1 2 3** |
| **Вход** | **Изход** |
| **0**  **-100000 -99999 -99998 -1 0 1 99998 99999 100000** | **-100000 -99999 -99998 -1 0 1 99998 99999 100000**  **-99999 -99998 -1 0 1 99998 99999**  **-99998 -1 0 1 99998**  **-1 0 1**  **0** |
| **Вход** | **Изход** |
| **0**  **-100000 -99999 -99998 -1 0 1 99998 99999 100000** | **-100000 -99999 -99998 -1 0 1 99998 99999 100000**  **-99999 -99998 -1 0 1 99998 99999**  **-99998 -1 0 1 99998**  **-1 0 1**  **0** |
| **Вход** | **Изход** |
| **1**  **-100000 -99998 -99996 -99994 -4 -2 0 2 4 99994 99996 99998 100000** | **(празен низ)** |
| **Вход** | **Изход** |
| **10**  **-100 100 -90 90 -80 80 -70 70 -60 60 -50 50 -40 40 -30 30 -20 20 -10 10 0** | **100 -90**  **90 -80**  **80 -70**  **70 -60**  **60 -50**  **50 -40**  **40 -30**  **30 -20**  **20 -10**  **10 0** |
| **Вход** | **Изход** |
| **30**  **20 7 9 5 11 27 8 27 13 12 17 14 13 4 5 13 28 11 5 5 15 17 28 19 11 18 2 10 7 126 29 15 5 6 18 18 26 3 9 3 28 5 19 11 27 28 21 2 27 17 28 12 21 27 4 8 20 23 2226 28 21 1 7 17 28 9 27 17 25 3 8 26 3 16 13 10 8 13 20 10 9 10 25 8 18 24 7 3 1** | **18 2 10**  **20 10**  **19 11**  **19 11** |
| **Вход** | **Изход** |
| **100**  **20 7 9 5 1127 8 27 13 12 17 14 13 4 5 13 28 11 5 5 15 17 28 19 11 18 2 10 7 126 29 15 5 6 1818 26 3 9 3 28 5 19 11 27 28 21 2 27 17 28 12 212 27 4 8 20 23 22 26 28 21 1 7 17 28 9 27 17 25 3 8 26 3 16 13 10 8 13 20 10 9 10 25 8 18 24 3333** | **3 8 26 3 16 13 10 8 13**  **27 13 12 17 14 13 4**  **20 10 9 10 25 8 18**  **11 5 5 15 17 28 19**  **5 5 15 17 28 19 11**  **26 28 21 1 7 17** |
| **Вход** | **Изход** |
| **100**  **1 13 27 10 2 28 22 10 7 10 21 29 15 2 3 2 28 8 17 27 23 11 2 11 28 23 18 19 22 14 1 1 29 10 21 6 13 20 22 3 11 3 17 11 16 2 22 9 18 15 2 9 1 9 23 19 12 17 12 9 11 3 17 23 10 20 1 6 11 26 18 8 16 15 17 20 24 20 24 26 1 9 2 8 13 21 29 21 16 3 23 26 9 14 22** | **9 11 3 17 23 10 20 1 6**  **19 12 17 12 9 11 3 17**  **13 20 22 3 11 3 17 11**  **10 20 1 6 11 26 18 8**  **21 29 15 2 3 2 28**  **6 11 26 18 8 16 15**  **2 28 22 10 7 10 21**  **1 29 10 21 6 13 20**  **26 18 8 16 15 17**  **8 16 15 17 20 24** |
| **Вход** | **Изход** |
| **100**  **1 13 27 10 2 28 22 10 7 10 21 29 15 2 3 2 28 8 17 27 23 11 2 11 28 23 18 19 22 1** | **21 29 15 2 3 2 28**  **2 28 22 10 7 10 21** |
| **Вход** | **Изход** |
| **50**  **27 28 21 2 27 17 28 12 21 27 4 8 20 23 22 26 28 21 1 7 17 28 9 27 17 25 3 8 26 3** | **28 21 1**  **21 2 27** |