

Enter five points: 1.0 2.5 3 4 5 6 7 8 9 10

The bounding rectangle's center (5.0, 6.25), width 8.0, height 7.5

- \*10.16 (*Divisible by 2 or 3*) Find the first 10 numbers with 50 decimal digits that are divisible by 2 or 3.
- \*10.17 (*Square numbers*) Find the first 10 square numbers that are greater than Long.MAX\_VALUE. A square number is a number in the form of  $n^2$ . For example, 4, 9, and 16 are square numbers. Find an efficient approach to run your program fast.
- \*10.18 (*Large prime numbers*) Write a program that finds five prime numbers larger than Long.MAX\_VALUE.
- \*10.19 (*Mersenne prime*) A prime number is called a *Mersenne prime* if it can be written in the form  $2^p - 1$  for some positive integer  $p$ . Write a program that finds all Mersenne primes with  $p \leq 100$  and displays the output as shown below. (*Hint:* You have to use `BigInteger` to store the number because it is too big to be stored in `long`. Your program may take several hours to run.)

p	$2^p - 1$
2	3
3	7
5	31

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{i!}$$

In order to get better precision, use `BigDecimal` with 25 digits of precision in the computation. Write a program that displays the  $e$  value for  $i = 100, 200, \dots$ , and  $1000$ .

**10.21 (Divisible by 5 or 6)** Find the first 10 numbers greater than Long.MAX\_VALUE that are divisible by 5 or 6.

**\*\* 10.22 (Implement the String class)** The String class is provided in the Java library. Provide your own implementation for the following methods (name the new class `MyString1`):

```
public MyString1(char[] chars);
public char charAt(int index);
public int length();
public MyString1 substring(int begin, int end);
public MyString1 toLowerCase();
public boolean equals(MyString1 s);
public static MyString1 valueOf(int i);
```

public  
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public

**\*\*10.25** (New style array of delimited strings) Create an array of strings including

For example, let  $A$  be an array of  $n$  elements, and  $\epsilon \in (0, 1]$ .

\*10.26 (Calculate the length of the string in the following. For example, the length of the string "abc" is 3.)

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