

CPSC1150 Practice Questions (3)

1. Write an algorithm to decide if a given positive integer can be written as the sum of two perfect squares. For example, the number 58 is the sum of 9 and 49, both of which are square, but the number 14 cannot be written as such a sum.
2. The Fibonacci numbers are used in population growth studies. The first few Fibonacci numbers are:
1, 1, 2, 3, 5, 8,
That is, starting at the third number, each number is the sum of the previous two numbers.
 - Write a static method to make and return an array of a given size from the calling method with Fibonacci numbers.
 - Write another static method to find out which numbers in the above array are two's powers.
3. Write a java program to read in a sequence of positive integers and print out the largest increase observed from one value in the sequence to the next. The sequence will be terminated as soon as a negative number is entered.
For example, if the sequence of numbers is 7, 20, 16, 25, 36, and -1 then the increases observed are 13, -4, 9, 11, so the program would print 13. Don't output anything other than the single numerical value requested.
4. Write a java method which receives as input a single letter. The method returns the corresponding digit on the telephone. The letters and digits on a telephone are grouped this way:

2 = ABC	4 = GHI	6 = MNO	8 = TUV
3 = DEF	5 = JKL	7 = PRS	9 = WXY

No digit corresponding to Q or Z. For these two letters, your function should return a negative number.
5. Write a method that reads a sentence ended with a period, then computes and displays the frequency of each letter regardless of its type. For example, if the sentence were "It is a wonderful day", the method would display the following:

A	has occurred 2 time(s)
D	has occurred 2 time(s)
E	has occurred 1 time(s)
F	has occurred 1 time(s)
I	has occurred 2 time(s)
6. Write a method that receives a positive integer, as input, and determines how many bits are required to represent it. For example, three bits are required to represent values 4 through 7 and four bits are needed for numbers from 8 through 15, and so on. Make sure that your algorithm covers the entire range of numbers from 0 to 32767 (biggest 16-bit integer)
7. Write a java method that accepts an array of positive integer numbers. The method displays the corresponding ordinal forms for the numbers in the array.
For example if the array contains the following numbers:
21 345 42 83 789
The method displays:
21st 345th 42nd 83rd 789th

8. Using Top-Down design methodology, write a java program to convert a decimal number to a hexadecimal number.
9. Using Top-Down design methodology, write a java program that asks the user to enter 16 zeros and ones representing a binary number. The program then displays the signed decimal number represented by the 16 bits binary number.
Note that two's complement method should be used for negative numbers.
10. What is the value of variable y in the following example:

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int x = -270;  
byte y = (byte)x;
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