C++ Lab-3 Summation Date: 24/03/2022

1. Write an int method cube () that returns the cube of the value inserted .
2. Write a float method triangle() that computes the area of a triangle using its two formal parameters h and w, where h is the height and w is the length of the bases of the triangle.
3. Write a float method rectangle() that computes and returns the area of a rectangle using its two float formal parameters h and w, where h is the height and w is the width of the rectangle
4. The formula for a line is normally given as y = mx + b. Write a method Line() that expects three float parameters, a slop m, a y-intercept b, and an x-coordinate x. the method computes the y-coordinate associated with the line specified by m and b at x-coordinate.
5. Write a method Intersect() with four float parameters m1,b1,m2,b2. The parameters come conceptually in two pairs. The first pair contains the coefficients describing one line; the second pair contains coefficients describing a second line. The method returns 1 if the two lines intersect. Otherwise, it should return 0;
6. Write a program that accepts a positive integer from the user and displays the factorial of the given number. You should use a recursive method called factorial() to calculate the factorial of the number.
7. Write another program that accepts a number from the user and returns the Fibonacci value of that number. You should use recursion in here.
8. Write a program to the find the following
   a. Prime number checking
   b. Sum of digit
9. Write a program to arrange the numbers in ascending order
10. Write a program accepts list of marks of students and counts the number of students who have scored marks greater than 20 in an exam out of 30. The total number of students who took the test is to be entered from the keyboard.
11. Write and run a program that reads 9 digit phone number and then prints "mobile." if the phone number start with 9, otherwise it prints "fixed phone." For example if the phone number is 911999999, it prints "mobile".
12. Write a program that displays the maximum and the minimum of a list of numbers entered from the keyboard. Where the size of the list is to be entered from the keyboard.
13. Write a program that reverses the digits of a given positive integer number entered from the keyboard.
14. Write a program that searches for the Greatest Common Divisor (GCD) of two natural numbers.

15. Write a program that searches for the Least Common Multiple (LCM) of two natural numbers.
16. Write a program to sum the following series:

    1/3 + 3/5+ 5/7+ 7/9 + 9/11 + 11/13 + … + 95/97 + 97/99
17. An ISBN (International Standard Book Number) consists of 10 digits d1d2d3d4d5d6d7d8d9d10 .The last digit is a checksum, which is calculated from the other nine digits using the following formula:
    *(d1 * 1 + d2 * 2 + d3 * 3 + d4 * 4 + d5 * 5 + d6 * 6 + d7 * 7 + d8 * 8 + d9 * 9) % 11*
    If the checksum is 10, the last digit is denoted X according to the ISBN convention. Write a program that prompts the user to enter the first 9 digits and displays the 10-digit ISBN (including leading zeros). Your program should read the input as an integer. For example, if you enter 013601267, the program should display 0136012671.

18. Write an application that computes the value of ex by using the formula

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

19. Write a program that displays all the leap years, ten per line, in the twenty-first century (from 2001 to 2100).

20. Write a program that reads integers, finds the largest of them, and counts its occurrences. Assume that the input ends with number **0**. Suppose that you entered **3 5 2 5 5 5 0**; the program finds that the largest is **5** and the occurrence count for **5** is **4**.
    (*Hint*: Maintain two variables, **max** and **count**. **max** stores the current max number, and **count** stores its occurrences. Initially, assign the first number to **max** and **1** to **count**. Compare each subsequent number with **max**. If the number is greater than **max**, assign it to **max** and reset **count** to **1**. If the number is equal to **max**, increment **count** by **1**.)
    E.g. Enter numbers: 3 5 2 5 5 5 0
    The largest number is 5
    The occurrence count of the largest number is 4

21. Write a program that displays all integers between low and high that are the sum of the cube of their digits. In other words, find all numbers xyz such that $xyz = x^3+y^3+z^3$, for example, $153= 1^3+5^3+3^3$. Try 100 for low and 1000 for high.
22. Write a program that returns the number of digits in an integer argument; for example, 23,498 has five digits. The program repeatedly asks for input and displays the number of digits the input integer has. Stop the repetition when the input value is negative.
23. There are 25 primes between 2 and 100, and there are 1229 primes between 2 and 10,000. Write a program that inputs a positive integer $N > 2$ and displays the number of primes between 2 and N (inclusive).
24. A perfect *number* is a positive integer that is equal to the sum of its proper divisors. A proper divisor is a positive integer other than the number itself that divides the number evenly (i.e., no remainder). For example, 6 is a perfect number because the sum of its proper divisors 1, 2, and 3 is equal to 6. The next is 28 = 14 + 7 + 4 + 2 + 1. There are

four perfect numbers less than 10000. Eight is not a perfect number because 1 + 2 + 4 + 8 . Write a program that accepts a positive integer and determines whether the number is perfect. Also, display all proper divisors of the number.

25. Write a program that reads an unspecified number of integers, determines how many positive and negative values have been read, and computes the total and average of the input values (not counting zeros). Your program ends with the input 0. Display the average as a floating-point number. Here is a sample run:

    Enter an int value, the program exits if the input is 0:
    The number of positives is 3
    The number of negatives is 1
    The total is 5
    The average is 1.25

26. Suppose that the tuition for a university is $10,000 this year and increases 5% every year. Write a program that computes the tuition in ten years and the total cost of four years' worth of tuition starting ten years from now.
27. Write a program that convert from kilograms to pounds, miles to kilometers, and from hour to minutes based on the choice of the user.
28. Write a program that prompts the user to enter the number of students and each student's name and score, and finally displays the student with the highest score and the student with the second-highest score.
29. Write a program that prompts the user to enter the number of students and each student's name and score, and finally displays the name of the student with the highest score.
30. Write a program that displays all the numbers from 100 to 200, ten per line, that are divisible by 5 or 6, but not both.
31. Write a program that prints the characters in the ASCII character table from '!' to '~'. Print ten characters per line.

32. Use nested loops that print the following patterns in four separate programs:

Pattern I Pattern II Pattern III Pattern IV

A.
```
     1
    2 1
   3 2 1
  4 3 2 1
 5 4 3 2 1
6 1 6 5 4 3 2 1
```

B.
```
1 2 3 4 5 6
 1 2 3 4 5
  1 2 3 4
   1 2 3
    1 2
     1
```

33. Write a program that prompts the user to enter an integer from 1 to 15 and displays a pyramid, as shown in the following sample run:

```
Enter the number of lines: 7
      1
    2 1 2
  3 2 1 2 3
4 3 2 1 2 3 4
```

5 4 3 2 1 2 3 4 5
6 5 4 3 2 1 2 3 4 5 6
7 6 5 4 3 2 1 2 3 4 5 6 7

34. Write a nested for loop that prints the following output:

1
1 2 1
1 2 4 2 1
1 2 4 8 4 2 1
1 2 4 8 16 8 4 2 1
1 2 4 8 16 32 16 8 4 2 1
1 2 4 8 16 32 64 32 16 8 4 2 1
1 2 4 8 16 32 64 128 64 32 16 8 4 2 1

35. Write a program that lets the user enter the loan amount and loan period in number of years

Loan Amount: 1000
Number of Years: 5

Interest Rate	*Monthly*	*Payment Total Payment*
5%	*188.71*	*11322.74*
5.125%	*189.28*	*11357.13*
5.25%	*189.85*	*11391.59*
...		
7.875%	*202.17*	*12129.97*
8.0%	*202.76*	*12165.83*

36. Write a program that prompts the user to enter a decimal integer and displays its corresponding hexadecimal value. Don't use Java's **Integer.toHexString(int)** in this program.

37. Develop a program that uses the method factorial() to compute an approximation of e (Euler's number). Base your approximation on the following formula for e:

    a. 1 + 1/1! + 1/2! + 1/3! + ...

38. Write a method called isPrime() that accepts a number and determine whether the number is prime or not.

39. Write a method called isEven() that uses the remainder operator(%) to determine whether an integer is even or not.

40. Modify our calculator problem of worksheet-3 using four methods sum(),product(),quotient() and difference().

41. Write a java code that computes the sum of the following series.

    Sum = 1! + 2! + 3! + 4! + ...n!