# CS 1101 – Introduction to Computer Science
# Spring 2022
# Lab 5- Perfect Numbers

**Due Date: Wednesday, February 23, end of the day (11:59pm).**

**Objective:** The goal of this assignment is to get familiar with taking input using **Scanner**, processing **variables**, **conditions,** and **loops**.

**Background:**
Perfect numbers are the positive integers that are equal to the sum of its factors except for the number itself. In other words, perfect numbers are the positive integers which are the sum of its proper divisors.
***Hint:*** *Think how you can implement a loop to find all the perfect numbers as described below.*

**Assignment:**

1. To begin, ask the user for an integer value. Assume that the value entered will be greater than 0.
   Welcome to Lab 5, Perfect Numbers! Please enter an integer value:

2. Find if the integer N entered is a perfect number. You can do this by looking for the factors of the number:

   *For example: If the user enters **6** on step 1, then:*
   *The factors of 6 are 1, 2, and 3*

   *Where N is the number entered by the user.*

3. Then add all the factors, if the sum is equal to N, then the number is a perfect number.

   *For example: The sum of the factors of 6 are (1 + 2 + 3) = 6*
   *Therefore, 6 is a perfect number.*

4. Display the following if the number entered by the user, is a perfect number.
   N is a perfect number!
   The factors are:

   Otherwise:
   N is not a perfect number.

**Sample output:**

Example 1-

```
Welcome to Lab 5, Perfect Numbers! Please enter an integer value:
6
6 is a perfect number!
The factors are: 1,2,3,
```

Example 2-

```
Welcome to Lab 5, Perfect Numbers! Please enter an integer value:
8
8 is not a perfect number.
```

**Deliverables:** You are expected to submit two files in Blackboard:

(i) Lab5_Lastname.doc--- containing the algorithm /pseudocode of your program, and
(ii) Lab5_Lastname.java --- the java file of your program.

**Grading Criteria:**

- [10 points] Algorithm.
  - Sequential, executable, finite, and correct.
- [87 points] Java program that is similar to the algorithm.
  - [35 points] Program compiles and runs.
  - [40 points] The program has correct logic and generates correct output.
  - [5 points] The program is indented properly.
  - [5 points] The program uses meaningful variable names.
  - [2 points] The program has proper documentation.
- [3 points] The deliverables follow the proper name Lab5_LastName
- Late submission: [**-10**] points for every 24 hours after the deadline.

If you need any clarification, please ask your TA for further details.