Assignment – I
(To be submitted on or before 30th April, 2020)

1.   Implement the heap sort algorithm using Java.

2.   Write a program that tests some of the built-in subroutines for working with Strings. The program should ask the user to enter their first name and their last name, separated by a space. Read the user's response using TextIO.getln(). Break the input string up into two strings, one containing the first name and one containing the last name. You can do that by using the indexOf() subroutine to find the position of the space, and then using substring() to extract each of the two names. Also output the number of characters in each name, and output the user's initials. (The initials are the first letter of the first name together with the first letter of the last name.) A sample run of the program should look something like this:

> *Please enter your first name and last name, separated by a space.*
> *? Mary Smith*
> *Your first name is Mary, which has 4 characters*
> *Your last name is Smith, which has 5 characters*
> *Your initials are MS*

3.   Write a program that simulates rolling a pair of dice. You can simulate rolling one die by choosing one of the integers 1, 2, 3, 4, 5, or 6 at random. The number you pick represents the number on the die after it is rolled. The expression

> *(int)(Math.random()*6) + 1*

does the computation to select a random integer between 1 and 6. You can assign this value to a variable to represent one of the dice that are being rolled. Do this twice and add the results together to get the total roll. Your program should report the number showing on each die as well as the total roll. For example:

> *The first die comes up 3*
> *The second die comes up 5*
> *Your total roll is 8*

4.   Write a program that will evaluate simple expressions such as 17 + 3 and 3.14159 * 4.7. The expressions are to be typed in by the user. The input always consists of a number, followed by an operator, followed by another number. The operators that are allowed are +, -, *, and /. You can read the numbers with TextIO.getDouble() and the operator with TextIO.getChar(). Your program should read an expression, print its value, read another expression, print its value, and so on. The program should end when the user enters 0 as the first number on the line.