**Lab 02**

Objectives:

● Learn to use Java to generate random numbers

● Learn to use Java to implement control
statement

1. **Monte Carlo Method** is a method of solving problems using statistics. Given the probability, P, that an event will occur in certain conditions, a computer can be used to generate those conditions repeatedly. The number of times the event occurs divided by the number of times the conditions are generated should be approximately equal to P.

    We can estimate the value of PI using the Monte Carlo method. If a circle of radius r is inscribed inside a square with side length $2r$, then the area of the circle will be πr^2 and the area of the square will be $4r^2$, and the ratio of the area of the circle to the area of the square will be $\pi/4$. Therefore, if you pick n points at random inside the square and find m points inside the circle, then π can be approximated as follows: $\pi \sim= 4m/n$

    Monte-Carlo Method

    $$\pi \approx \frac{783}{1000} \times 4 = 3.132$$
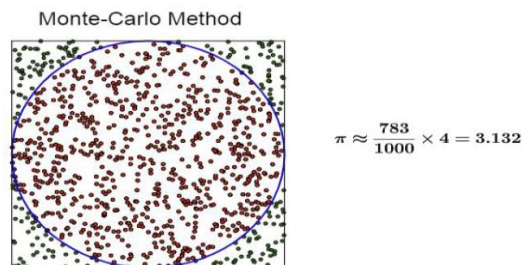
    You are asked to write a simulation program to estimate the value of PI. By the law of large numbers, increasing the number of sample points in the above simulation will make the approximation closer to the expected value 3.1415.


    ```
    Output – JLab (run) ×   BacktrackSolver.java ×   ISolver.java ×   Sudoku.java ×
    run:
    This program approximates PI using the Monte Carlo method.
    Please enter number of throws (n): 1000
    Computed PI = 3.124, Difference = 0.017592653589793006
    BUILD SUCCESSFUL (total time: 6 seconds)
    ```

2. Write a Java program to count letters, spaces, numbers and other characters in an input string.
    Expected Output:
    The string is : aiuy 587 3.9078
    letter: 23 space: 9 number: 10 other: 6

- END -