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CSE 2221 Homework 4

Professor Bucci

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1. Implementation of the pointIsInCircle method:

```
private static boolean pointIsInCircle(double xCoord, double yCoord) {
    double x = xCoord;
    double y = yCoord;
    boolean inCircle = false;
    if ((((x - 1.0) * (x - 1.0)) + ((y - 1.0) * (y - 1.0))) < 1.0) {
        inCircle = true;
    }
    return inCircle;
}
```

2. Implementation of the numberOfPointsInCircle method:

```
private static int numberOfPointsInCircle(int n) {
    int ptsInInterval = 0, ptsInSubinterval = 0;
    Random rnd = new Random1L();
    while (ptsInInterval < n) {

        double r = rnd.nextDouble();
        double x = 2 * r;
        r = rnd.nextDouble();
        double y = 2 * r;

        ptsInInterval++;
        if (pointIsInCircle(x, y) == true) {
            ptsInSubinterval++;
        }
    }
    return ptsInSubinterval;

}
```

3. Implementation of the main method of the MonteCarlo lab using the two above methods:

```
public static void main(String[] args) {
    /*
     * Open input and output streams
     */
    SimpleReader input = new SimpleReader1L();
```

```
        SimpleWriter output = new SimpleWriter1L();
        /*
         * Ask user for number of points to generate
         */
        output.print("Number of points: ");
        int n = input.nextInteger();
        int ptsInCircle = numberOfPointsInCircle(n);

        /*
         * Estimate proportion of points generated in [0.0,2.0)x[0.0,2.0)
         * interval that fall in the set {(x,y) in R:x^2 + y^2 < 1}
         */
        double proportion = (double) ptsInCircle / n;
        double areaOfCircle = 4.0 * proportion;
        output.println("Estimate for the area of a circle of radius r=1: "
                + areaOfCircle);

        /*
         * Close input and output streams
         */
        input.close();
        output.close();
    }
```