

π Day

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Bonus Lab

Who doesn't love calculating the digits of π ?? Who doesn't love bonus points??

The digits of pi can be calculated by dropping random points in a square and calculating how many of those points fall within the circle.

(5 points) Prove that the following equation is true:

$$\pi = 4 * P(\text{point is in the circle})$$

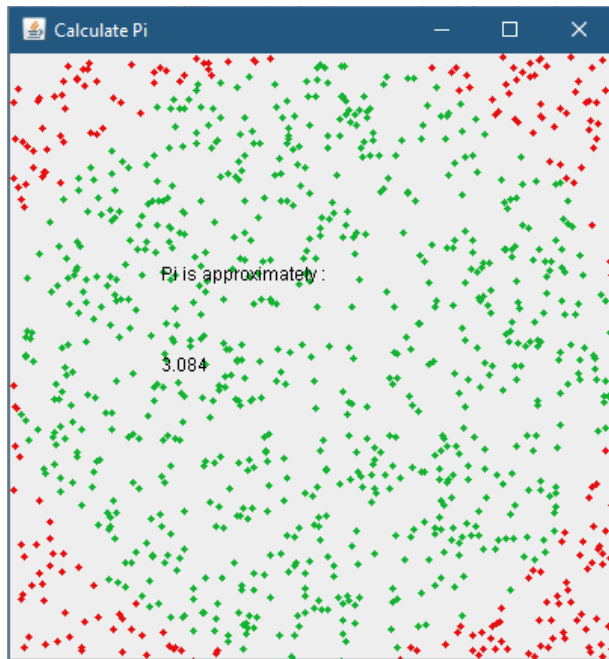
(20 points) Write code that simulates dropping random points on a square. Points falling within the circle should be green. Points outside the circle should be red. You should be able to easily change the number of points to increase the accuracy in your estimation of pi.

Below are the additional requirements of your code –

- A. Create a loop that repeats until all points have been drawn.
- B. Your loop should do the following:
 - a. Generate a random x and y value inside your canvas
 - i. *hint: what is the size of the canvas created in the main method?*
 - b. Use the distance formula to determine if the point is within the circle
 - i. Your circle should just touch all 4 sides of the canvas
 - ii. The center of your circle should be at the center of the canvas
 - iii. The distance formula is as follow: $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
 - c. Points inside the circle should be one color
 - d. Points outside the circle should be another color
 - e. Count how many of the points are inside the circle
- C. Calculate the ratio of points inside the circle to total points drawn
- D. Print the result of 4*ratio

Use the APIs to help with how other methods work. You will need to use the Math class to generate random numbers and to calculate the distance formula.

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