1. We multiply the value from step 5 by 4 because the hypotenuse that we calculate is only in the first quadrant (positive x and y). Thus, we are only getting ¼ of the area of the circle. In order to get the full area of the circle, we must multiply the value from step 5 by 4.
2. The difference between Math.PI and our estimate decreases with parameters of increasing size. Meaning that the accuracy of our estimate for Pi is increasing.
3. No, it changes every time because the random function gives us different points within the quadrant every time.
4. 10,000,000 takes multiple seconds to run. 1,000,000,000 took so long I needed to close out of the window.
5. Estimate was 3.180846 and the difference was 0.03925
6. The Monte-Carlo can be used to estimate almost any integral. One other use of the Monte-Carlo method is modeling the effects of monthly cashflows on an investment portfolio. A Quora user knew the average return and variance of the portfolio, so he built a MCS to help understand how the timing of cashflows effected the goal of staying above a critical account value.