

## Description:

The implementation for the Broken Stick Problem using Monte Carlo is solved by having a for loop running 10 million iterations of random points. For each simulation, point A and point B are randomly generated, resulting in a number between 0 to 1000. In my implementation, I represent the stick to have a size of 1,000. With points A and B on the stick, the first segment would be the minimum of both points from 0. The second segment would be the distance between the two points, and the third segment would be the maximum of the two points until 1,000. From the Triangle Inequality Theorem, for a triangle to exist, two sides added together must be greater than the third side. If this condition is satisfied, a triangle can be created. However, if this is not satisfied, a triangle cannot be created, and using these two values, we can calculate the probability of a triangle being created for this problem.

## Probability:

The probability calculated by the code to 3 significant digits is 0.250, or 25.0%.

## Code:

```
#include <iostream>
#include <iomanip>
using namespace std;
int main() {
    unsigned int segmentOne = 0, segmentTwo = 0, segmentThree = 0, pointA,
pointB;
    double triangleFailure = 0.0, triangleSuccess = 0.0;
    for (unsigned int i = 0; i <= 10000000; i++) {
        pointA = rand() % 1001;
        pointB = rand() % 1001;
        segmentOne = min(pointA, pointB);
        segmentTwo = max(pointA, pointB) - min(pointA, pointB);
        segmentThree = 1000 - max(pointA, pointB);
        if (((min(min(segmentOne, segmentTwo), segmentThree)) +
(max(min(segmentOne, segmentTwo), min(max(segmentOne, segmentTwo),
segmentThree)))) > (max(max(segmentOne, segmentTwo), segmentThree)))
            triangleSuccess++;
        else
            triangleFailure++;
    }
    cout << "Probability: " << setprecision(3) << triangleSuccess /
(triangleSuccess + triangleFailure) << endl;
}
```

- Triangle Inequality Theorem: <https://andymath.com/triangle-inequality-theorem/>
- Median of 3 Numbers using Min and Max: <https://stackoverflow.com/questions/1582356/fastest-way-of-finding-the-middle-value-of-a-triple>