

Final Analysis

1)

26 characters to choose from

Chances of a collision -

$$\frac{{}^{26}P_3}{{}^{26}P_3^r} = \frac{\frac{(26!)}{(23)!}}{26^3} = \frac{26 \cdot 25 \cdot 24}{26^3} = .88$$

88% probability of collision

2) Prediction: angle in radians determines when the recursion stops

The smaller the angle of input, the faster the function will terminate:

if (angle > tol && angle < tol)

constant

as the program goes on, the angle will get smaller and smaller until it returns

When angle of 0 is input, there is only 1 call

3) Randomizing the Servicing and arrival times clearly randomizes the outcome of the # of customers on a particular day as well as their wait time. On a particularly bad day, customers will overwhelm the clerks, skyrocketing the number in line and their wait time. Slow days are uneventful.

4) The easiest way to prove the difference in the Selection Sort and the Merge Sort is by how many elements are sorted.

Selection Sort

$$\sum_{i=0}^{P-1} \left(\sum_{j=i+1}^P P_{os} \right) + P_{os}$$

P can be small or as large as the array. For small values of P, the Selection Sort will always be better than the Merge Sort because the merge sort must sort the whole array.