Q7.

Set the length of each piece as . Assume Without losing generality, we also assume .

When these pieces could form a polygon, must satisfy:

which is equivalent to

On the other hand, cutting a stick with (N-1) cut points is equivalent with cutting a circle with N cut points. Therefore, we are trying to find the probability of cutting a circle with N cut points not all in one semi-circle. P(all pieces of stick form a polygon) = 1 - P(cutting a circle with all N cut points within a semi-circle)

Given one cut point i, we define event starting at this point i, the other N - 1 points are within the clockwise semicircle. It’s easy to know that = . Since all are mutually exclusive. P(cutting a circle with all N cut points within a semi-circle) =

Thus, P(all pieces can form an N sided polygon) =

Q6.

We first calculate the probability of tossing 100 consecutive heads at specific position.

P(1-100th tossing are heads) =

P(2-101th tossing are heads =

…

P(i-(100+i-1)th tossing are heads =

…

Since are not exclusive events, , where N is the number of all possible position of 100 consecutive heads.

Thus, we have:

The statement that the probability of tossing 100 consecutive heads is less than 0.01% is correct.