Median-of-Median Algorithms with different Stopping Lengths

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Q1.

Since we are given m longer part of the L-length bar, it is equivalent to m samples sampled uniformly from .The smallest value in these m-longer samples are the 1st order statistics of these samples drawn from uniform distribution.

According to Wikipedia’s introduction to order statistics(<https://en.wikipedia.org/wiki/Order_statistic#Order_statistics_sampled_from_a_uniform_distribution>), we have that the distribution of the 1st order statistics of a standard uniform distribution follows beta distribution. For the 1st order statistics out of m random samples from uniform distribution on [0,1], it follows Beta(1,m) distribution, the mean of this distribution is . Therefore, for a uniform distribution on , the mean of the 1st statistics will take up portion of the region. Therefore, the mean length of the smallest of these m-many longer-pieces of candy stick is .

Q2.

From Q1, we have found that the shortest length of the worst case array length is . Therefore, we will have the following formula for the execute time if the array size is n:

Following the previous process: