

Homework 6

Randomized Algorithms

Due Wednesday, October 18

1. Suppose you are given a graph whose edge lengths are all integers in the range from 0 to B . Suppose also that you are given the all-pairs distance matrix for this graph (it can be constructed by a variant of the deterministic distance algorithm we gave in class). Prove that you can identify the (successor matrix representation of the) shortest paths in $O(B^2 MM(n) \log^2 n)$ time, where $MM(n)$ is the time to multiply $n \times n$ matrices.
2. Let S be an unknown set of n items (with n known). Suppose that you receive a sample T of k items chosen from S uniformly at random *without replacement*. Show how to construct a sample T' of k items from S , whose distribution is identical to a uniform sample of k items from S drawn *with replacement*.