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.