HW #4, Due Thursday, Oct. 11

1. Show that a modification of the Min-Cut randomized algorithm, where instead of a random edge, a random pair of vertices is contracted can produce exponentially low probability of success. Just find an example of an input graph and analyze it.

2. Compute the probability of false positive for the Bloom filter in two alternative versions:

(i) each hash function h_i is taken from a separate interval of length m/k;

(ii) all hash functions are distinct valued.

3. Apply the LLL to bound from below the van der Waerden number $W(k)$, that is the smallest integer n such that every 2-coloring of $[n]$ results in a monochromatic arithmetic progression of length k.