Sublinear time algorithms	October 19, 2009
Homework 0	
Lecturer: Ronitt Rubinfeld	*Due Date: October 26,2009*

Homework guidelines: The following problems are for your understanding. Do not turn it in, but make sure you can solve it.

1. Show that given any algorithm A that runs in time $T(n)$ on inputs of size n with probability of error $1/4$, one can convert it into a new algorithm B that runs in time $O(T(n)\log 1/\beta)$ with probability of error at most β. (Hint: run A $O(\log 1/\beta)$ times and take the majority answer. Use Chernoff bounds.)

2. You are given an approximation scheme $\mathcal{A}$ for f such that $Pr[\frac{f(x)}{1+\epsilon} \leq \mathcal{A}(x) \leq f(x)(1+\epsilon)] \geq 3/4$, and $\mathcal{A}$ runs in time polynomial in $1/\epsilon, |x|$. Construct an approximation scheme $\mathcal{B}$ for f such that $Pr[\frac{f(x)}{1+\epsilon} \leq \mathcal{B}(x) \leq f(x)(1+\epsilon)] \geq 1-\delta$, and $\mathcal{B}$ runs in time polynomial in $\frac{1}{\epsilon}, |x|, \log\frac{1}{\delta}$.

3. Show that if a graph G is ϵ-far from the class of n-vertex, degree bound $d \geq 2$, connected graphs, then G has at least $\epsilon dn/8$ connected components, each containing less than $8/(\epsilon d)$ vertices.