1. Given a graph $G$ of max degree $d$, and a parameter $\epsilon$, give an algorithm which has the following behavior: if $G$ is connected, then the algorithm should pass with probability 1, and if $G$ is $\epsilon$-far from connected (at least $\epsilon \cdot dn$ edges must be added to connect $G$), then the algorithm should fail with probability at least $3/4$. Your algorithm should look at a number of edges that is independent of $n$, and polynomial in $d, \epsilon$. For extra credit, try to make your algorithm as efficient as possible in terms of $n, d, \epsilon$.

For this homework set, when proving the correctness of your algorithm, it is ok to show that if the input graph $G$ is likely to be passed, then it is $\epsilon$-close to a graph $G'$ which is connected, without requiring that $G'$ has degree at most $d$.

2. In class we gave an MST approximation algorithm for graphs in which the weights on each edge were integers in the set $\{1..w\}$. Show that one can get an approximation algorithm when the weights can be any value in the range $[1..w]$ (it is ok to get a slightly worse running time in terms of $w, 1/\epsilon$).