Sub-linear Algorithms March 2, 2017

Homework 3

Lecturer: Ronitt Rubinfeld *Due Date: March 9, 2017*

Turn in your solution to each *problem on a separate sheet of paper, with your name on each one.*

1. The diameter of an unweighted graph is the maximum distance between any pair of nodes. Give a tester for graphs with degree at most d (where d is a constant and the graph is represented in the adjacency list model) that have low diameter. The tester should have the following specific behavior:

   (a) Graphs with diameter at most D are always accepted.

   (b) Graphs which are ϵ-far (that is, at least ϵdn edges must be added) from having diameter $4D + 2$ are failed with probability at least $2/3$.

   (c) The query complexity of the tester should be polynomial in $D, d, 1/\epsilon$.