CS 909, (Randomized Algorithms) Assignment Sheet 3 (Due , 03)

1. Show that for any collection of hash function H. there exists x, y such that

   $$\sum_{h \in H} \delta_h(x, y) \geq |H|(\frac{1}{m} - \frac{1}{n})$$

   where n and $m$are the sizes of universe and table respectively.

2. Describe a data structure for doing point location among a set of line n non-intersecting line segments, i.e. reporting the line segment directly above the query point. Use the idea of incremental construction of trapezoidal map and do point location by keepin track of the *new trapezoid* as we insert the next line segment.

3. Show that the running time for the Klein-Karger-Tarjan MST algorithm holds with high probability. Look closely at the recursion tree and bound the size of each sub-problem.

4. Modify the min-cut algorithm of Karger for weighted graphs.