Algorithms for Big Data

Fall Semester 2019
Exercise Set 12

Exercise 1:
Show $\Omega(n)$ lowerbound for number of edges algorithm has to "touch" to solve $(1 \pm \varepsilon)$ multiplicative approximation for estimating number of connected components.

Exercise 2:
Let $G_1, G_2, \ldots, G_w$ be unweighted graphs such that: $e \in G_i$ iff $w(e) \leq i$. Denote by K_i the number of connected components of G_i. Show that weight of MST satisfies

$$w(\text{MST}) = (n - 1) + \sum_{i=1}^{w-1}(K_i - 1)$$

Exercise 3:
Why does rounding weights of the input graph to nearest full power of $(1 \pm \varepsilon)$ does not provide any significant speed-up for cell-probe MST algorithm?