Foundation of Computer Science — FM2

Assignment 1a on the video lectures from "2-1" to "4-7"

1. Which of the following choices is the tightest upper bound for the functions

   (a) $f(n) = \frac{1}{2}n(n+1)$,

   (b) $f(n) = \frac{1}{2^n}$,

   (c) $f(n) = \frac{n^2}{1+n}$,

   $O(n)$, $O(n^3)$, $O(1)$ or $O(n^2)$?

2. Is $f(n) = n \log n$ of order $O(n^2)$? Is $f(n)$ also $\Omega(n^2)$?

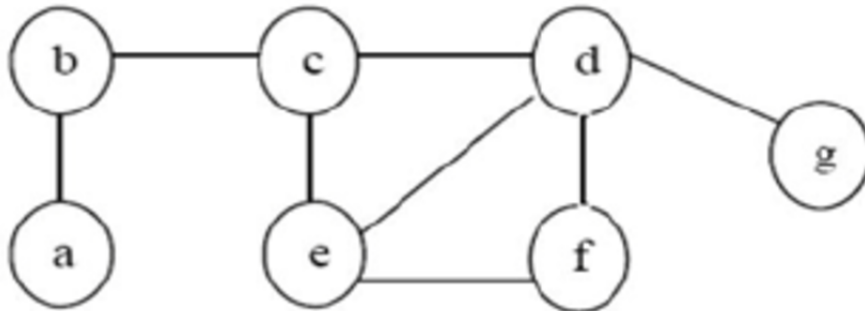3. Demonstrate the BFS algorithm by computing the distances of all nodes to node a.

Figure 1: Graph von G

4. Illustrate the Mergesort algorithm by sorting the list

$$(3, 9, 6, 10, 4, 1, 2, 8).$$

   Why does Mergesort follow the devide-and-conquer paradigm?