Helwan University

Faculty of Computers and Information

Computer Science Department

2nd Level

CS 316 Algorithms

Helwan
University

Algorithms HW#4

1. Compare between: Selection sort, Insertion sort, Bubble Sort, Merge Sort, according to:
   a. Time complexity -Best, average and Worst case.
   b. Stability.
   c. Memory usage.
   d. Whether the algorithm is serial or parallel.

2. Give asymptotic tight bounds for $T(n)$ in each of the following recurrences. Assume that $T(n)$ is constant for $n \leq 2$.
   a) $T(n) = 2T(n/2) + n^3$.
   b) $T(n) = T(9n/10) + n$.
   c) $T(n) = 16T(n/4) + n^2$.
   d) $T(n) = 7T(n/3) + n^2$.
   e) $T(n) = 7T(n/2) + n^2$.
   f) $T(n) = 2T(n/4) + \sqrt{n}$
   g) $T(n) = 3T(n/2) + n \lg n$.
   h) $T(n) = 5T(n/5) + n/\lg n$.
   i) $T(n) = 4T(n/2) + n^2 \sqrt{n}$

3. Give asymptotic tight bounds for the following problems
   a) Tower of Hanoi
   b) Fact (n)
   c) Fib (n)
   d) Binary search

Good Luck