CS 22203: Design and Analysis of Algorithms, Jan-May, 2025

Assignment 2

1. Estimate the time complexity of the following recurrence equations using the Recursion tree method:

a) $T(n) = 2T(n/2) + n^2$

b) $T(n) = 4T(n/2) + n^2$

c) $T(n) = 3T(n/2) + n$

d) $T(n) = T(n/2) + cn$

e) $T(n) = 6T(n/3) + n^2$

1. Estimate the time complexity of the following recurrence equations using the Master theorem

a) $T(n) = 2T(n/2) + n^2$

b) $T(n) = 4T(n/2) + n^2$

c) $T(n) = 2T(n/2) + n$

d) $T(n) = 3T(n/2) + n$

e) $T(n) = T(n/2) + cn$

f) $T(n) = \sqrt{2}T(n/2) + \log n$

g) $T(n) = 6T(n/3) + n^2 \log n$

h) $T(n) = 64T(n/8) - n^2 \log n$

3. The recurrence $T(n) = 7T(n/2) + n^2$ describes the running time of an algorithm A. Another algorithm B has a running time of $R(n) = aR(n/4) + n^2$. What is the largest integer value of a such that B is asymptotically faster than A?
