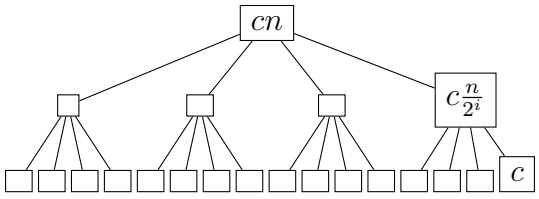
Problem Set 2

Name: Your Name

Collaborators: Name1, Name2

Problem 2-1.

(a) $T(n) = 4T(\frac{n}{2}) + O(n)$



$T(n) = \sum_{i=0}^{logn} 4^i \frac{n}{2^i} = n \sum_{i=0}^{logn} 2^i = n(2n-1) = \Theta(n^2)$

(b)

$$T(n) = 3T(\frac{n}{\sqrt{2}}) + O(n^4) = \sum_{i=0}^{\log_{\sqrt{2}} n} 3^i (\frac{n^4}{4^i}) \tag{1}$$

$$= 4n^4(1 - (\frac{3}{4})^{log_{\sqrt{2}} n+1}) = O(n^4) \tag{2}$$

(c)

$$T(n) = 2T(\frac{n}{2}) + 5nlogn = \sum_{i=0}^{logn} 2^i \frac{5nlogn}{2^i} \tag{3}$$

$$= 5nlogn(logn + 1) = O(nlog^2 n) \tag{4}$$

Problem 2-2.

(a)

(b)

(c)

Problem 2-3.

Problem 2-4.

Problem 2-5.

(a)

(b)

(c) Submit your implementation to alg.mit.edu.