

# Homework 1 Solutions

January 31, 2013

1. **Problem 1.2-3 on page 14 Solution:** The smallest value of  $n$  such that an algorithm whose running time is  $100n^2$  runs faster than an algorithm whose running time is  $2^n$  is 15.
2. **Problem 2. Solution:**

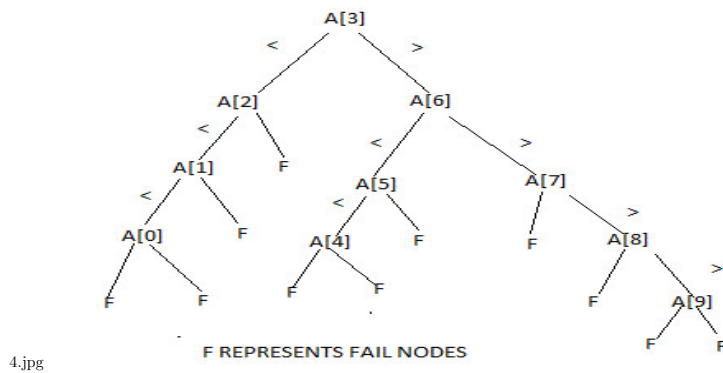


Figure 1: The graph

Analysis: Array size is decreasing by 3 in each step so the recursive relation is

$$A(n) = A(n/3) + 2$$

This comes from the fact that in each iteration the program does either 1 comparison or 2 depending on which side of the tree we go and divides the array into 3 equal parts. So after the second iteration it becomes:  $A(n) = A(n/9) + 4$

From this we get the recurrence relation and our worst case time is:

$$O(2 \log_3 n) = \frac{2 \log_2 n}{\log_2 3}$$

which is greater than  $\log_2 n$