

Homework Two, due Tue 10/16

CSE 101

Notes.

1. At the top of your homework, write your name and ID number. Also indicate the discussion section at which you will pick up the graded homework.
2. This homework is due within the first five minutes of class on the due date.
3. Whenever asked to come up with an algorithm, you must always prove its correctness and running time.
4. Please make your answers as concise as possible.

Homework problems.

1. While discussing algorithms for computing the Fibonacci numbers F_n , we came across the recurrence relation

$$T(n) = \begin{cases} T(n-1) + T(n-2) + 1 & \text{if } n > 1 \\ 2 & \text{if } n = 1 \\ 1 & \text{if } n = 0 \end{cases}$$

- (a) Show by induction that $T(n) = F_{n+3} - 1$.
 - (b) Show that $T(n) = \Theta(F_n)$.
2. Exercise 3.2(b).
 3. Exercise 3.3.
 4. Exercise 3.4(i).
 5. Exercise 3.9.
 6. Exercise 3.14.
 7. The *diameter* of an undirected graph $G = (V, E)$ is the maximum distance between any pair of nodes.
 - (a) Show that if each node has degree at most two, then the diameter of G must be at least $\log_2 n - 1$.
 - (b) Generalize part (a) to the case where each node has degree at most Δ , where Δ is some number greater than one.
 8. Exercise 3.28.