

ECE G205 Fundamentals of Computer Engineering
Fall 2004

Homework 7: Due by Monday November 29 2004

- This test contains 2 problems. They allow you to earn 100 points.
- Show your work, as partial credit can be given. You will be graded not only on the correctness of your answer, but also on the clarity with which you express it. **Be neat.**
- **No late submissions will be accepted.**
- Only homework returned in a 9in × 12in envelope will be accepted. (If you cannot find such envelope, ask the Instructor.) Please, write your name and the class name (ECE G205) on the envelope (write clearly, please).
- For the two problems below NO code has to be sent to the TAs.

Write your name here: _____

- **Problem # 1 [50 points].** Imagine a competition where two teams *BRS* and *SLC* play no more than $2n - 1$ games, the winner being the first team that achieves n victories. Assume that there are no tied games, that the results of each match are independent and that for any given match there is a constant probability p that team *BRS* will be the winner and hence a constant probability $q = 1 - p$ that team *SLC* will win. Using a dynamic programming approach, compute the probability that team *BRS* will be the winner. (Hint: Let $P(i, j)$ be the probability that team *BRS* will be the winner given that they still need i more victories to win, while team *SLC* still needs j more victories if they are to win $P(n, n)$ is what you want. Why?) Compute the time complexity of your solution.

- **Problem # 2 [50 points].** Write an iterative and a recursive function for computing the n th element F_n of the *Fibonacci* sequence. The Fibonacci sequence is a sequence of integers so defined: $F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$. Discuss the worst case time complexity of the two solutions.