

EECS 336: Design and Analysis of Algorithms Weekly Problem Set #4

Class Homepage: www.cs.northwestern.edu/~kao/eecs336-algorithms/index.htm

Posted on the Class Homepage: Tuesday, October 21, 2014.

Due Time: the start of class on Tuesday, October 28, 2014.

Policy for This Problem Set: Different problem sets may have different policies. This problem set is to be done by one student singly. To answer the questions in this problem set, you may consult your textbook, your lecture notes, the Internet, and any materials that you can find in libraries. You may also discuss solution ideas for these questions with the instructor or the teaching associates, but no one else. You may not copy answers from other people, including those from your fellow students or those posted on the Internet. If you copy all or portions of your answers from other people, you will receive 0 point for the entire problem set. If two students have identical or essentially identical answers but the original sources of the answers cannot be determined, both students will receive 0 point for the entire problem set.

Questions: There are 2 questions.

1. (60 points) Prove that the total cost of incrementing a 4-ary counter n times is $O(n)$. Here we define the cost of an increment to be the number of times a digit in the counter is changed by this increment. Give three analyses, one for each of the aggregate method, the accounting method, and the potential method.
2. (40 points) Exercise 17.2-3 on page 459. Modify this exercise by changing the reset operation from “reset to zero” to “reset to 10”. Give two analyses, one for each of the accounting method and the potential method.