CSCE 222 [Sections 502, 503] Discrete Structures for Computing
Spring 2017 – Hyunyoung Lee

Problem Set 8

Due dates: Electronic submission of *yourLastName-yourFirstName-hw8.tex* and *yourLastName-yourFirstName-hw8.pdf* files of this homework is due on **Monday, 4/10/2017 *before* the beginning of class** on `http://ecampus.tamu.edu`. You will see two separate links to turn in the .tex file and the .pdf file separately. Please do not archive or compress the files. A signed paper copy of the pdf file is due on **Monday, 4/10/2017** at the beginning of class. **If any of the three submissions are missing, your work will not be graded. Late submissions of any form will not be accepted.**

Name: Joseph **Section: Martinsen**

Resources. (All people, books, articles, web pages, etc. that have been consulted when producing your answers to this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: ____

In this problem set, you will earn total $100 + 10$ (extra credit) points.

Problem 1. (10 points) Section 6.4, Exercise 38, page 422

Solution.

$$\begin{aligned} n(n+1)\cdot 2^{n-1} &= n(n-1+2)\cdot 2^{n-2} \\ &= n(n-1)\cdot 2^{n-2} + n2^{n-1} \end{aligned}$$

$n(n-1)\cdot 2^{n-2}$ corresponds to the number of ways of choosing a subset of n elements when the two elements are different.
$n2^{n-1}$ corresponds to the number of ways of choosing a subset of set of n elements when the 2 elements are the same.
$\therefore$ the number of ways to choose a subset of of a set of n elements with 2 separate items that may or may not be differential-able is given in the statement.

Problem 2. (10 points) Section 8.1, Exercise 10, page 511 [Hint: Let s_n denote the number of bit strings of length n that contain the string 01. One of the initial conditions is $s_0 = 0$.]

Solution.

Problem 3. (10 points) Section 8.1, Exercise 28, page 512. This problem has two parts as below.

Solution.
a) (4 points) Show that the Fibonacci numbers satisfy . . .
b) (6 points) Use this recurrence relation to show that . . . (prove by induction on n)

Problem 4. (10 points) Section 8.1, Exercise 32 a), b), c) and d), page 512

Solution.

Problem 5. (5×8 pts $= 40$ points) Section 8.2, Exercise 4 a), b), c), d), and e), page 524. *For each subproblem, prove by induction that the closed form solution you found is correct. Each subproblem is worth 8 points: 3 points for the closed form solution and 5 points for the correct induction proof.*

Solution.

Problem 6. (10 points) Section 8.2, Exercise 8, pages 524–525

Solution.

Problem 7. (10 points) Section 8.4, Exercise 6 a), b), c), d) and e), page 549

Solution.

Problem 8. (10 points) Section 8.4, Exercise 8 a), b), c), d) and e), page 549

Solution.

Checklist:
☐ Did you type in your name and section?
☐ Did you disclose all resources that you have used?
(This includes all people, books, websites, etc. that you have consulted)
☐ Did you sign that you followed the Aggie honor code?
☐ Did you solve all problems?
☐ Did you submit both the .tex and .pdf files of your homework separately to the correct link on eCampus?
☐ Did you submit a signed hardcopy of the pdf file in class?