Handout 21

COMP 163: Discrete Structures (Section 001) Fall 2015
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Exam IV November 26 60 points total

**OPEN BOOK AND NOTES. CALCULATORS ARE PERMITTED.**

Write your answers in the spaces provided. Use the back of the paper if you need more room. Put a box around your final answer if there could otherwise be any confusion.

Name_____

The problems are arranged mostly according to the order in which we covered the material, but you will probably want to get easy problems out of the way first to make sure you don't run out of time without working on all the problems.

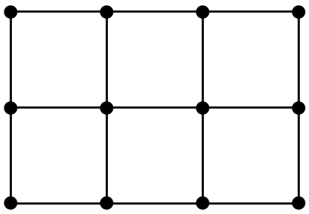
**EX4-1** (7 points) Two fair dice are rolled. (a) List the members of the sample space that belong to the event that the sum of the numbers on the dice is 9. (b) Give the simplest possible expression for the probability of this event.

**EX4-2** (5 points) Suppose you are given a fair coin to flip once and told that if you get heads, you will earn \$2, but if you get tails you will need to pay \$1 (i.e., you will earn \$-1). What is the expected value of your earnings?

**EX4-3** (20 points) Solve the recurrence $a_n = 8a_{n-1} - 16a_{n-2}$ with $a_0 = 2$ and $a_1 = 20$.

**EX4-4** (8 points) Consider the recurrence $a_n = 7a_{\lfloor n/2 \rfloor} - 10a_{\lfloor n/4 \rfloor}$, with $a_1 = 0$ and $a_2 = 9$. Apply appropriate substitutions to reexpress this recurrence (and the initial conditions) so as to obtain a second-order linear homogeneous recurrence with constant coefficients. Show what substitutions you are using and what the outcome is. You do *not* need to solve the recurrence.

**EX4-5** (6 points) Is the following graph bipartite? Explain why or why not.



**EX4-6** (14 points)

(a) Give the degree of each vertex in the graph below.
(b) Does the graph have an Euler cycle? Indicate why or why not.
(c) Give the adjacency-matrix representation of the graph.