

MATH 579 Exam 9 Part II; 5/11/10

Please read the exam instructions.

No books or notes are permitted for this exam; calculators are permitted though. Please write your answers on separate paper, indicate what work goes with which problem, and put your name or initials on every sheet. Cross out work you do not wish graded; incorrect work can lower your grade, even compared with no work at all. Keep this sheet for your records. Show all necessary work in your solutions; if you are unsure, show it. Simplify all numerical answers to be integers, if possible. Please attach part I to your solutions. You have 35 minutes. If you wish, you may hand in solutions to all six problems (part I and II) on May 13. For more details, see the syllabus.

PART II: Choose three problems only from these five.

1. (5-8 points) Let a_n denote the number of ways to pay n dollars using the usual 1, 5, 10, 20, 50, 100 dollar bills. Find the generating function for a_n .
2. (5-10 points) Find the generating function that can be used to count how many non-negative integers a, b, c there are with $a + b + c = n$ and (1) $a \leq 2$, (2) b is a multiple of 3, (3) c is odd.
3. (5-10 points) Solve the recurrence $a_0 = 0, a_n = a_{n-1} + 3^n$ using generating functions.
4. (5-10 points) Solve the recurrence $a_0 = 2, a_n = 3a_{n-1} - 2$ using generating functions.
5. (5-12 points) What are all the possible ways to number three dice (with positive integers) so that the probability distribution of their total is the same as the probability distribution of three dice with ordinary numbering?