

Math 579 Exam 3 (part I): 2/20/7

Please read the exam instructions. New text has been added (in italics).

Please write your answers on **separate paper**, indicate clearly what work goes with which problem, and put your name 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 list of problems for your records. Show all necessary work in your solutions; if you are unsure, show it. Each problem is worth a minimum of 5 points, and a maximum that is indicated. You have 40 minutes. *Simplify all numerical answers to be positive integers, if possible.* Choose three problems.

1. (8 points) Our class has 18 students, 13 males and 5 females. How many ways are there to form a study group of 4 students that contains at least one male and at least one female?
2. (10 points) In how many ways can we place three red rooks, two black rooks, and one white rook on an ordinary 8×8 chessboard so that no two rooks attack each other?
3. (10 points) Andy and Brenda are playing a game with five unusual dice, each of which has eight equally probable sides (numbered 1,2,3,4,5,6,7,8). They roll the five dice. If at least one of the dice shows an 8, then Andy wins (otherwise Brenda wins). Who is more likely to win?

For the next two problems, remember that a positive integer must have its leading digit be nonzero. (e.g. 012345 is not a six-digit positive integer)

4. (10 points) How many six-digit positive integers are there that contain the digit 0 and are divisible by 9?
5. (12 points) How many six-digit positive integers are there that contain the digit 1 and whose digits are all different?