

MATH 579 Exam 3: 2/26/9

Please read the exam instructions.

Please write your answers on separate paper, indicate clearly 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 list of problems 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. You may earn extra credit by submitting by the next class period (Mar. 3), revised solutions to all six problems – for more details, please see the syllabus.

PART I: Choose three problems only from the first five.

1. (5-8 points) Our class has 19 students, 14 males and 5 females. How many ways are there to form a study group of five students that contains at least one male and at least one female?
2. (5-10 points) How many odd, four digit numbers, have distinct digits?
3. (5-10 points) We want to select three subsets A, B, C from $[n]$, so that $A \neq \emptyset$ and $B \cap C = \emptyset$. How many ways are there to do this?
4. (5-10 points) I want to play racquetball on five occasions in January; however I need 3 full days of rest between game days. How many schedules are there?
5. (5-12 points) To play the California Fantasy 5 lottery game, you pick five numbers from $[39]$, as does the state. The prizes vary depending on receipts, but the best day historically paid \$402,112 for matching all five, \$645 for matching four, \$20 for matching three, and \$1 for matching two. On that day, what was the expected value of one ticket? You may assume that the prizes are not divided among multiple winners.

PART II:

6. (10-20 points) How many surjective (onto) functions are there that have as domain $\{A, B, C, D, E, F\}$ and have as codomain $\{X, Y, Z\}$?