

MATH 579 Exam 6 Part II; 4/8/10

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 the next class day, April 13. For more details, see the syllabus.

PART II: Choose three problems only from these five.

1. (5-8 points) How many permutations $p \in S_4$ satisfy $p^2 = 1$?
2. (5-10 points) A permutation p is called an involution if $p^2 = 1$. Prove that for $n > 1$, the number of involutions in S_n is even.
3. (5-10 points) Let n be even. Prove that $c(n, n/2) \geq \frac{n!}{2^{n/2}(n/2)!}$.
4. (5-10 points) Let $n \geq 3$. How many n -permutations have 1, 2, 3 in the same cycle?
5. (5-12 points) Let $n \geq 3$. How many n -permutations have 1 in the same cycle with either 2 or 3, but not both?