

Math 579 Exam 6 (part I): 3/22/7

Please read the exam instructions.

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. *Choose three problems.*

1. (8 points) Calculate $s(3, k)$ for all integer k .
BONUS: What does this tell us about $(x)_3$?
2. (10 points) How many n -permutations contain 1, 2, and 3 in three different cycles?
3. (10 points) Let $u(n)$ denote the number of n -permutations whose cube is the identity permutation. Find $u(6)$.
4. (10 points) Find a recursive formula for the number $t(n)$ of n -permutations whose fifth power is the identity permutation.
5. (12 points) Prove that $p^{n!}$ is the identity permutation, for every n -permutation p .