

MATH 3094 HW 4 PERMUTATIONS COMPUTATION (HANDWRITTEN WORK IS OK)

YOUR PREFERRED FIRST AND LAST NAME

Credit: Write down everyone who helped you, including classmates who contributed to your thought process (either through sharing insights or through being a sounding board). Write down Judson's textbook and other written sources you used as well.

Required
— Emily

Please remove this instruction section when you are done.

— Emily

Instruction.

You can complete this homework by hand or $\text{\LaTeX}$. Either submit a physical copy (in class) or upload a PDF (if handwritten) or your Overleaf link on HuskyCT.

Note: Don't spend too much time on these computation homework. If you are not sure how to do something, please post on Piazza or come to office hour.

Exercises. No proofs are necessary. From Judson Chapter 3 Exercises <http://abstract.ups.edu/aata/exercises-groups.html>, please complete ...

- i) (Required) Find at least one classmate that you just met this semester, and share and discuss at least a couple homework exercises with them for at least a few minutes. Write down their name/s and briefly summarize your interaction with them.
- ii) Exercise 2a-d. Which tables form a group?
- iii) Exercise 3 (part 1) Consider the rigid motions of a (non-square) rectangle given in Figure 3.5 in Section 3.1 <http://abstract.ups.edu/aata/section-mod-n-sym.html#groups-subsection-symmetries>. Write out the Cayley table. You can follow what Judson does in Table 3.7 for the rigid motions of the equilateral triangle.
- iv) Exercise 3 (part 2) Write out the Cayley table for the group $(\mathbb{Z}/4\mathbb{Z}, +)$. Follow class notes from week 3 Tuesday or see Table 3.10 (Cayley table for $(\mathbb{Z}/5\mathbb{Z}, +)$) on <http://abstract.ups.edu/aata/section-groups-define.html>

Date: deadline: Week 4 Thursday, September 20, 2018, 3:30pm.

- v) Exercise 3 (part 3) How many elements are in each group? Are the groups the same? Why or why not?
- vi) Exercise 5. Give a Cayley table for the symmetries of a square. How many ways can the vertices of a square be permuted? Is each permutation necessarily a symmetry of the square? (Note: We will denote the symmetry group of the square by D_8 even though some people denote this by D_4).
- vii) Exercise 47. Prove or disprove: If H and K are subgroups of a group G , then $H \cup K$ is a subgroup of G .
- viii) Exercise 49. Let a and b be elements of a group G . If $a^4b = ba$ and $a^3 = e$, prove that $ab = ba$. [Click here for a hint.](#)
- ix) Approximately how much time did you spend on this homework?