TW 314 (Applied Discrete Mathematics)

Tutorial 1: 2 February 2017

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1. Which of the following are groups? ($\mathbb{R}$ denotes the set of real numbers.)

   (a) $(\mathbb{R}, +)$

   (b) $(\mathbb{R}, \times)$

   (c) $(\mathbb{R} - \{0\}, \times)$

2. List the permutations of $\mathbb{N}_4$ in cycle notation.

3. Let s and t be the permutations of $\mathbb{N}_8$ with cycle notations $s = (123)(456)(78)$ and $t = (1357)(26)$. Find cycle notations for

   (a) st

   (b) ts

   (c) s^2

   (d) s^{-1}

   (e) t^{-1}

4. There are eight symmetry transformations of a square. List them, and draw up its group table.

5. Let $\alpha = (15)(27436)$ and $\beta = (1372)(46)$ be permutations of $\mathbb{N}_7$. Calculate the orders of α and β, considered as elements of the symmetric group S_7. What are the orders of $\alpha\beta$ and $\beta\alpha$?
