1. **Biggs 5.6 # 19 page 112**

2. Is there a permutation of $\mathbb{N}_7$ which has order 10? Is there one of order 11? of order 9?

3. Let $\alpha = (135)(24)$. Find at least 6 permutations of $\mathbb{N}_5$ that commute with $\alpha$ (we say permutations $\alpha$ and $\beta$ commute if $\alpha \beta = \beta \alpha$).

4. (a) How can you decide whether a permutation is even or odd if you know the lengths of its cycles?
   (b) Prove that any permutation in $S_n$ can be written as the product of at most $n - 1$ transpositions.

5. Suppose you have an unlimited supply of water, a drain, a large container and two jugs which hold 7 and 9 liters, respectively. How would you arrange to put one liter of water in the container?

6. **Biggs 6.6 # 5 page 129**
   What is the last digit in the base 10 representation of $7^{93}$?