EE2302 Foundations of Information Engineering

Assignment 10 **Due: 6 pm, Nov 23 (Wed)**

(Full mark: 24 marks)

1. (5 points) Write down the Cayley tables for **all** groups of order 4. How many **distinct** groups are there? (Two groups are the same if the same table can be obtained by re-labelling some of the elements.)

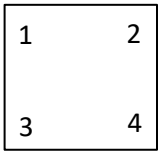
2. (4 points) Find **all** subgroups of $\mathbb{Z}_6$ under addition.

3. Consider the group of symmetry for equilateral triangles as discussed in the lecture notes.

   a) (3 marks) Write down its multiplication table.

   b) (2 marks) Is it an Abelian group? Explain your answer from (a).

4. Consider the following square, whose corners are labeled as 1, 2, 3, and 4, as shown below:



   a) (4 points) Consider its group of symmetries. Let r denote clockwise rotation by 90^0 and f denote flipping along the y-axis. Write down all of its group elements and draw the corresponding configurations of the square with corners labelled.

   b) (1 points) What is the order of rf? Explain your answer.

   c) (1 points) Is it an Abelian group? Explain your answer.

   d) (4 points) List all its subgroups.