

Assignment 1 - Problem 1:

- **[Ex. 1]** Write a Prolog program for testing whether a given pair $\langle S, Op \rangle$ forms a *Group*.
- Assume that (i) S is a finite set and (ii) Op is a binary operation on S .
 - Assume that S and Op are defined extensionally (i.e. by enumerating the items). [e.g. $S = \{0, 1\}$ and $Op = \{(0, 0, 1), (0, 1, 1), (1, 0, 0), (1, 1, 1)\}$]
 - Note that for this pair to be a group: (i) Op must be closed and associative (ii) S must include an identity element for Op , and (iii) for any element in S there is a corresponding inverse element in S w.r.t Op .

- Choose an appropriate representation for sets.
- [Ex. 2] Add rule(s) to your program to test whether a given Group is Abelian (i.e. whether Op is commutative).
- [Ex. 3 required for 3-person teams] Add rule(s) to your program to find the order of a given element in a given Group.

For a given element e , k is its order, iff k is the smallest positive integer such that $e^k = i$, where i is identity element for Op, and e^k is defined as follows:

- $e^1 = e$
- $e^k = e \text{ Op } e^{k-1}$ for $k > 1$