(1) Under congruence mod $m = 13$, determine those $b \in U(13)$ such that (as sets)
$$\{1, 2, \ldots, 12\} = \{b^1, b^2, b^3, \ldots, b^{12}\}$$
where the order of the elements on the right hand side is not necessarily the same as that on the left.

[10 points]

(2) For $i = \sqrt{-1}$, the imaginary unit, let $C = \{1, -1, i, -i\}$.
Show that C is a group under multiplication, and compute its group table.
You may assume the operation is associative.

[10 points]