1. Let the binary operation on $\mathbf{Z}$ be defined by

$$x * y = (x+1)(y+1).$$

Determine whether or not $\mathbf{Z}$ is a group with respect to $*$, and justify your answer.

2. Determine whether the set
$$\{[1], [3], [7], [9]\} \subseteq \mathbf{Z}_{10}$$
is a group with operation multiplication, and justify your answer.

3. Let P denote the set of polynomials in x of degree at most 1 (so the set of polynomials of the form $ax + b$, where a and b may be any real number). Determine whether P is a group with the operation addition, and justify your answer.