Question: Is set of odd numbers with binary operations (+), i.e., $\langle 0, + \rangle$ an abelian group? If not explain the reasons with necessary notations.

Ans:-

The set of Odd numbers under addition $\langle 0, + \rangle$ is not an Abelian group.

Reasons:-

① closure fails : Odd + Odd = Even $\notin 0$.

② No Identity : Additive identity is 0, but $0 \notin 0$.

③ Associativity and Commutativity hold (since integers under + are associative & commutative).

④ Inverses exist (-a of Odd a is also odd).

∴ since closure and identity axiom fail, $\langle 0, + \rangle$ is not a group, hence not Abelian group.