Statement: Prove that every odd natural number is of one of the forms 4n + 1 or 4n + 3, where n is an integer.

(Idea:)

proof:

For an arbitary integer n, let integer k such that $n=2k+1$

case 1: k is even

let $k=2m$

$n=2(2m)+1$

$n=4m+1$ ....(1)

n can be of form 4m+1

Case 2:k is odd

let $k=2m+1$

$n=2(2m+1)+1$

$n=4m+3$ ....(2)

n can be of form 4m+3

$\therefore$Every odd integer can be of form 4n+1 or 4n+3