لا يكتب في
هذا الهامش

Quiz(2) الاجابة النموذجية

Q1: Prove that if x is an odd integer, then $9x+5$ is even

Method (1) direct proof $p \to q$

Assume x is an odd integer

So, $x = 2m+1, \ m \in \mathbb{Z}$

Now, $9x+5 = 9(2m+1)+5$

$= 18x + 9 + 5 = 18x + 14$

$= 2(9x+7) = 2r, \ r = 9x+7 \in \mathbb{Z}$

i.e $9x+5$ is even.

لا يكتب في
هذا الهامش

Q2 Prove that, if $n \in \mathbb{Z}$

$(n+1)^2 - 1$ is even $\Leftrightarrow$ n is even

(i) ($\Rightarrow$) Assume $(n+1)^2 - 1$ is even $\Rightarrow$

to show that n is even.

"Proof by contrapositive" ($p \to q \equiv \neg q \to \neg p$)

" If n is odd $\Rightarrow n = 2k+1 \Rightarrow$

$(n+1)^2 - 1 = (2k+2)^2 - 1 = 4k^2 + 8k + 3$

$= 2(k^2 + 4k + 1) + 1 = 2r + 1$

(such that $r = k^2 + 4k + 1 \in \mathbb{Z}$)

So, $(n+1)^2 - 1$ is odd

(ii) ($\Leftarrow$) Assume n is even $\Rightarrow$ Show that

$(n+1)^2 - 1$ is ~~even~~ also

Now, $n = 2k \Rightarrow (n+1)^2 - 1 = (2k+1)^2 - 1$

$= 4k^2 + 4k \cancel{+} = 2(k^2 + 2k)$

$= 2t, \; t = k^2 + 2k \in \mathbb{Z}$

$\Rightarrow (n+1)^2 - 1$ is even.

Quiz (2)

Quiz

Q(1) Prove that if x is an odd integer, then $9x+5$ is even

Q(2) Let $n \in \mathbb{Z}$, Prove that:

$(n+1)^2-1$ is even if and only if n is even