(3) $\forall n \in \mathbb{Z}$ (n^2+n+1 is odd)

True

Proof: $\forall n \in \mathbb{Z}$ $\quad n^2+n+1 = n(n+1)+1$

but $n(n+1)$ must be even

since an odd • even is even and

$n(n+1)$ is either even • odd or odd • even

Therefore $n(n+1)+1$ is an even plus one

$\Rightarrow$ n^2+n+1 is odd $\forall n \in \mathbb{Z}$

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addendum

Just in case you need proof of odd • even = even

$\forall p \in \mathbb{Z}$ $\quad 2p$ is even

$2p+1$ is odd

$(2p)(2p+1) = 4p^2+2p = 2(2p^2+p) = 2m$ is even

(where $m = 2p^2+p$)
