Q.5

Prove that for any integer n, at least one of the integers n, $n+2$, or $n+4$ is divisible by 3.

Proof: Every integer is of the forms $3k$, $3k+1$, $3k+2$.

If $n=3k$, n is divisible by 3.

If $n=3k+1$, $n+2=3k+3$, $n+2$ is divisible by 3.

If $n=3k+2$, $n+2=3k+4$, $n+4=3k+6$, $n+4$ is divisible by 3.

In all cases, one of the integers n, $n+2$, or $n+4$, was divisible by 3.

Thus, the statement is proven.

QED ▨