

## Question 8

Prove that if  $n$  is a perfect square, then  $n + 2$  is not a perfect square.

Let  $n = m^2$ . If  $m = 0$ , then  $n + 2 = 2$ , which is not a perfect square. This means  $m \geq 1$ . The smallest perfect square greater than  $n$  is  $(m + 1)^2$ . We have  $(m + 1)^2 = m^2 + 2m + 1 = n + 2m + 1$ .

$n + 2m + 1 > n + 2 \cdot 1 + 1 > n + 2$ . Therefore,  $n + 2$  cannot be a perfect square.