If n is an integer and $\underbrace{n^3+5}_{(p)}$ is odd, then $\underbrace{n \text{ is even.}}_{q}$ $\neg q :=$ n is odd.

(by contradiction)

Assume that n^3+5 is odd. Assume, for a contradiction, that n is odd.

- $\exists k \in \mathbb{Z}$ s.t. $n^3+5 = 2k+1$ (1)
- $\exists m \in \mathbb{Z}$ s.t. $n = 2m+1$. (2)

$(2) \Rightarrow (1)$ $\qquad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$$(2m+1)^3 + 5 = 2k+1$$

$$\underbrace{(2m)^3 + 3(2m)^2(1) + 3(2m)(1)^2}+1^3+5 = 2k+1$$

$$8m^3 + 12m^2 + 6m + 6 = 2k+1$$

$$2(4m^3 + 6m^2 + 3m + 3) = 2k+1$$

Bec. $\mathbb{Z}$ closed under $+$ and $\cdot$,

$r = 4m^3 + 6m^2 + 3m + 3 \in \mathbb{Z}$

$$2r = 2k+1$$

Which is absurd, because even=odd.

$\Rightarrow$ n must be even.