

Problem Set 1

Riley Erickson

January 2025

1

Assuming n is odd, thus

$$n = 2y + 1$$

$$n^3 + 5 = (2y + 1)^3 + 5$$

Expansion:

$$8y^3 + 12y^2 + 6y + 6$$

Factor out the 2:

$$2(4y^3 + 6y^2 + 3y + 3)$$

Any integer multiplied by 2 is even.

2

its true since De Morgan's laws states $\overline{(A \cap B)} = \overline{A} \cup \overline{B}$

3

$$2^{y+1} > 5(y + 1)$$

$$2^{y+1} = 2 \times 2^y > 2 \times 5y = 10y.$$

$$10y > 5(k + 1)$$

$$10y > 5y + 5 \Rightarrow 5y > 5$$

$$y \geq 6. \quad 2^n > 5n \text{ for all } n > 5$$

4

p	q	$(\neg p \vee q) \wedge (p \wedge (p \wedge q))$	$(p \wedge q)$
T	T	T	T
T	F	F	F
F	T	F	F
F	F	F	F