



Tutorial Series Number 1 - Math1

Exercise 1

Among the following statements, which ones are true:

1. The sky is blue when it's sunny.
2. $2 + 2 = 5$.
3. All roses are red.

Exercise 2

Form the negation of the following statements:

1. $[(p \Rightarrow q) \vee r] \wedge (p \vee q)$.
2. $[(p \wedge q) \vee r] \Rightarrow (p \wedge r)$.

Exercise 3

Consider the following assertions:

- (a) $\exists x \in \mathbb{R}, \forall y \in \mathbb{R} : x + y > 0$; (b) $\exists x \in \mathbb{R}, \exists y \in \mathbb{R} : x + y > 0$;
(c) $\forall x \in \mathbb{R}, \forall y \in \mathbb{R} : x + y > 0$; (d) $\exists x \in \mathbb{R}, \forall y \in \mathbb{R} : y^2 > x$.

Are assertions (a), (b), (c), (d) true or false? Provide their negations.

Exercise 4: Direct reasoning

Show that if n is odd, then n^2 is odd.

Exercise 5: Induction

Prove by induction that, for any integer $n \geq 1$, the sum of the first n odd integers is given by the following formula:

$$1 + 3 + 5 + \dots + (2n - 1) = n^2$$

Exercise 6: Contrapositive reasoning

If x is an integer such that x^2 is not divisible by 3, then x is not divisible by 3.