ProofSpace Comprehension Quiz

Preliminaries

Number Systems, Quantifiers, and Their Negations

1 Decide if each of the following statements is true or false:

a) $(\forall x \in \mathbb{R})(x - 4 = 8)$.

b) $(\exists x \in \mathbb{N})(x + 4 = 3)$.

c) $(\exists x \in \mathbb{N})(1 < x < 10)$.

d) $(\forall x \in \mathbb{N})(x > 2)$.

e) $(\exists x \in \mathbb{R})(x^2 = 4)$.

f) $(\forall x \in \mathbb{R})(x^2 \geq 0)$.

2 Which of the following is the best interpretation of the sentence "$(\nexists x \in \mathbb{Q})(x^2 - 2 = 0)$"?

(a) There is no rational x such that $x^2 - 2 = 0$.

(b) For every rational x, $x^2 - 2 = 0$.

(c) It's not the case that $x^2 - 2 = 0$ for some x.

(d) None of the above options.

3 Which of the following is the best **negation** of the sentence "$(\exists x \in \mathbb{Z})(x^2 - 2 = 0)$"?

(a) $(\forall x \in \mathbb{Z})(x^2 - 2 = 0)$.

(b) $(\exists x \in \mathbb{Z})(x^2 - 2 \neq 0)$.

(c) $(\forall x \notin \mathbb{Z})(x^2 - 2 \neq 0)$.

(d) $(\exists x \notin \mathbb{Z})(x^2 - 2 = 0)$.

(e) None of the above options.