

Homework 2

MATH 300

(due Feb 14)

Feb 7, 2025

Problem 1. Formalize each of the following statements using the predicate calculus.

- (a) there is a number which is not divisible by any square.
- (b) Every prime number is greater than 1.

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Problem 2. For each of the following statements, write the negation of the sentences **without** the negation symbol “ \neg ”, and determine whether the sentence is true or false in the domain of the real numbers:

1. $\exists \epsilon((\epsilon > 0) \wedge (\forall x(x > 0 \Rightarrow x > \epsilon)))$.

2. $\forall x((x > 5) \Leftrightarrow (\forall y(y > -100)))$.

(Hint: Recall that $A \Leftrightarrow B \equiv (A \Rightarrow B) \wedge (B \Rightarrow A)$)

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Problem 3. Prove the following statement:

If both a and b are divisible by n , then $a + b$ is divisible by n .

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Problem 4. Prove that if n is even then $n + 2$ is even.