WORKSHEET 3

Date: 10/04/2022

Name:

Definitions

DEFINITION 1 (union)**.**

DEFINITION 2 (intersection)**.**

DEFINITION 3 (subset)**.**

DEFINITION 4 (equality of sets)**.**

DEFINITION 5 (Set difference)**.**

Practice Problems

1. Write whether each of the following statements is true or false.

   (a) $\forall x \in \mathbb{R}, \ \exists n \in \mathbb{N}$ such that $x^n \geq 0$.

   (b) $\forall a, b \in \mathbb{R}, \ (a+b)^2 = a^2 + b^2$.

   (c) $\exists z \in \mathbb{Z}$ such that $\sqrt{z} \in \mathbb{Z}$.

   (d) $\forall p, q \in \mathbb{Z}, \dfrac{p}{q} \in \mathbb{Q}$.

   (e) $\exists n \in \mathbb{Z}$ such that $\dfrac{n}{5} \in \mathbb{Z}$.

   (f) $\forall \pi \in \mathbb{Q}, \pi^2 \in \mathbb{Q}$.

(g) $\exists n \in \mathbb{Z}$ such that $n^2 < n$

(h) $\exists m \in \mathbb{>}$ such that $m^2 \leq m$

2. Let A and B be sets. Prove that $A \cap B = A$ if and only if $A = B$.

   (a) Write down the givens/assumptions in this statement. Its a biconditional statement so you should do these steps twice.

   (b) What is the goal? Write down what you want to prove.

   (c) Prove the statement above.

3. Suppose $A \subseteq B$, and $A \cap C = \emptyset$. Prove that $A \subseteq B \setminus C$.

    (a) Write down the givens/assumptions in this statement.

    (b) What is the goal? Write down what you want to prove.

    (c) Prove the statement above.