WORKSHEET 4

Date: 10/06/2022

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) $\forall p, q \in \mathbb{Q}, \exists r \in \mathbb{Q}$ such that $p \leq r \leq q$.

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

   (c) $\forall m, n \in \mathbb{N},\ m + n \leq m \cdot n$.

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

   (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. Let $A = \{ (\frac{1}{9})^n \mid n \in \mathbb{N}\}$, and let $B = \{ (\frac{1}{3})^n \mid n \in \mathbb{N}\}$

(a) Prove that $A \subseteq B$.

(b) Is A also a proper subset of B? if so, why?