

Quiz: August 23

This is a closed-book quiz, and no team-work or reference materials are permitted.

- (1) Write a negation of the following: For all $x, y \in \mathbb{R}$, if $xy = 0$ then $x = 0$ or $y = 0$.
- (2) Give a mathematically precise definition for each of the following set theoretic terms. In each case, be sure to include any needed context for your definition to make sense. [Example of needed context: If you are trying to define “subset,” be sure to indicate the sets that your definition will apply to. Example of a complete definition of subset: Set A is a subset of set B if $x \in A \Rightarrow x \in B$]
 - (a) Intersection.
 - (b) Relative complement.

Solution

- (1) There exist $x, y \in \mathbb{R}$ such that $xy = 0$, and neither $x = 0$ nor $y = 0$.

OR

There exist $x, y \in \mathbb{R}$ such that $xy = 0$ and $x \neq 0$ and $y \neq 0$.

- (2) Let A and B be sets.

- (a) The intersection of A and B is the set

$$A \cap B = \{x \mid x \in A \text{ and } x \in B\}$$

- (b) The relative complement of B in A is the set

$$A - B = \{x \mid x \in A \text{ and } x \notin B\}$$

Grading: Total points possible = 5.

0.5 pt for any reasonable effort.

1.5 pt for (1): - 0.5 point for each error (but minimum grade $\in \mathbb{R}^+ \cup \{0\}$).

3 pt for (2): 1.5 point for each of (a) and (b).