

Name: _____

1. (1 point) **T** True or False: A sequence of real numbers is convergent if and only if it is Cauchy.
2. (1 point) **F** True or False: Every set of real numbers has an accumulation point.
3. (1 point) **T** True or False: A set of real numbers could have many accumulation points.
4. (1 point) Fill in the blanks in the statement of the Bolzano-Weierstrass Theorem below:

“Every _____, _____ set of real numbers has at least one accumulation point.”

Solution: Every **bounded, infinite** set of real numbers has at least one accumulation point.

5. (1 point) Determine the error in the following argument:

Claim 1. For any sets A, B, C , $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

Proof. Let $a \in A \cap (B \cup C)$. Then $a \in A$ and either $a \in B$ or $a \in C$. If $a \in B$, then $a \in A \cap B$. If $a \in C$, then $a \in A \cap C$. Therefore, $a \in (A \cap B) \cup (A \cap C)$, and hence $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$. \square

Solution: The author only proved that $A \cap (B \cup C) \subseteq (A \cap B) \cup (A \cap C)$. They also need to prove $A \cap (B \cup C) \supseteq (A \cap B) \cup (A \cap C)$