Math 311 Section 01 **Quiz 4** Spring 2018

Name: ______________________________

1. (1 point) __**T**__ True or False: A monotone sequence of real numbers is convergent if and only if it is bounded.

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 $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$. □

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