

## Quiz 2

TRUE/FALSE: Write “True” in each of the following cases if the statement is *always* true and briefly justify your answer. Otherwise, write “False” and provide a counterexample or brief reasoning. The logic symbols make use of the textbook notation.

1. [2] (§2.2 #19) Given sets  $A$  and  $B$ ,  $A \setminus B = A \cap \overline{B}$
2. [2] (§2.2 #19) Given sets  $A$  and  $B$ ,  $(A \cap B) \cup (A \cap \overline{B}) = A$
3. [2] (HW3 §2.1 #2)  $\{1, 2\} \in \{1, 2, 3\}$ .
4. [2] (HW3 §2.1 #2)  $\{1, 2\} \subset \{1, 2, 3\}$ .

Free Response: Show your work! No credit is given without supporting work.

5. [4] (HW3 §2.5 #3) Find an example of two uncountable sets  $A$  and  $B$  such that
- (a)  $A \cap B$  is finite.
  
  
  - (b)  $A \cap B$  is countably infinite.
6. [4] (HW3 §3.1 #3) A palindrome is a string that reads the same forwards as it does backwards. Create and describe an algorithm for detecting if a string can be reordered into a palindrome.
7. [4] (§2.6 #37) Justify why the set of all computer programs in a particular programming language is countable.