Math 2366, Quiz #3, Summer 2014 Name KEY

Instructions: Show all work. Justify answers as completely as possible. If you are asked to prove something, mere computation is not enough. You must explain your reasoning. Be sure to state your conclusion clearly. Incomplete work or justification will not receive full credit. Use exact answers unless specifically asked to round.

1. If $A = \{2, 5, 7, 8\}$ and $B = \{0, 1, 5, 9\}$, find the following sets.
   a. $A \cup B$

   $\{0, 1, 2, 5, 7, 8, 9\}$

   b. $A \cap B$

   $\{5\}$

   c. $\mathcal{P}(A)$

   $\{\emptyset, \{2\}, \{5\}, \{7\}, \{8\}, \{2,5\}, \{2,7\}, \{2,8\}, \{5,7\}, \{5,8\}, \{7,8\}, \{2,5,7\}, \{2,5,8\}, \{5,7,8\}, \{2,7,8\}, \{2,5,7,8\}\}$

   d. $A \times B$

   $\{(2,0), (2,1), (2,5), (2,9), (5,0), (5,1), (5,5), (5,9), (7,0), (7,1), (7,5), (7,9), (8,0), (8,1), (8,5), (8,9)\}$

   e. $A - B$

   $\{2, 7, 8\}$

   f. $|A \cup B|$

   7

2. Prove that $A \cap \bar{A} = \emptyset$.

Suppose x is $(A \cap \bar{A})$ then $x \in A$ and $x \in \bar{A}$

but by definition of $\bar{A}$, no x in A is in $\bar{A}$, Therefore

there are no x's in both A & $\bar{A}$ $\Rightarrow$ $A \cap \bar{A} = \emptyset$.

3. If the Universal Set $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, write the subset $A = \{0, 3, 7, 9\}$ as a bit string.

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