CS 173, Fall 2015
Examlet 3, Part B

NETID:

FIRST: **LAST:**

Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1 2

1. (4 points) Is this claim true? Give a concrete counter-example or briefly explain why it's true.

   For any sets A, B, and C, $(A \cup B) - C = A \cup (B - C)$.

2. (4 points) Check the (single) box that best characterizes each item.

   If $x \in A - B$, then $x \in B$.

   ☐ true for all sets A and B ☐ true for some sets A and B ☐ false for all sets A and B

   Sets A and B are disjoint

   ☐ $A - B = B - A$ ☐ $A = \overline{B}$ ☐ $A \cap B = \{\emptyset\}$ ☐ $A \cap B = \emptyset$

3. (7 points) In $\mathbb{Z}_9$, find the value of $[5]^{38}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 8$.

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1. (4 points) $A = \{\text{fox, tiger, wolf, eagle, cat}\}$ $B = \{3, 4\}$ $C = \{6, 7\}$

   $A \times (B \cap C) =$

   $| A \times (B \cup C) | =$

2. (4 points) Check the (single) box that best characterizes each item.

   $A \times B = B \times A$ — true for all sets A and B ☐ — false for all sets A and B ☐ — true for some sets A and B ☐

   $\emptyset \subseteq A$ — true for all sets A ☐ — true for some sets A ☐ — false for all sets A ☐

3. (7 points) In $\mathbb{Z}_{11}$, find the value of $[7]^{38}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 10$.

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1. (4 points) Is this claim true? Give a concrete counter-example or briefly explain why it's true.

   For any sets A, B, and C, if $A \subseteq B$ then $A \times C \subseteq B \times C$.

2. (4 points) Check the (single) box that best characterizes each item.

   $A \cup B = A$ — true for all sets A and B ☐ — false for all sets A and B ☐ — true for some sets A and B ☐

   $\emptyset \times \emptyset =$ — $\emptyset$ ☐ $\{\emptyset\}$ ☐ $\{\emptyset, \emptyset\}$ ☐ $\{(\emptyset, \emptyset)\}$ ☐

3. (7 points) In $\mathbb{Z}_{11}$, find the value of $[7]^{40}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 10$.

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1. (4 points) $A = \{4, 5, 9\}$ $B = \{\text{arya}, \text{bran}\}$ $C = \{\ 2, 4, 10\ \}$

   $(A \cap C) \times B =$

   $|A \times B \times C| =$

2. (4 points) Check the (single) box that best characterizes each item.

   $\{13, 14, 15\} \times \emptyset =$ $\emptyset$ ☐ $\{\emptyset\}$ ☐ $\{13, 14, 15\}$ ☐

   $\emptyset \in A$ true for all sets A ☐ true for some sets A ☐ false for all sets A ☐

3. (7 points) In $\mathbb{Z}_{13}$, find the value of $[7]^{19}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 12$.

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Discussion: **Thursday** **2** **3** **4** **5** **Friday** **9** **10** **11** **12** **1** **2**

1. (4 points) $A = \{\text{apple}, \text{lemon}\}$ $B = \{4, 5, 9\}$ $C = \{\ (\text{apple}, 4),\ (5, \text{lemon})\ \}$

   $\emptyset \times B =$

   $(A \times B) \cap C =$

2. (4 points) Check the (single) box that best characterizes each item.

   $|A \cup B| = |A| + |B|$ true for all sets A ☐ true for some sets A ☐ false for all sets A ☐

   $A \times B = A$ true for all sets A and B ☐ false for all sets A and B ☐ true for some sets A and B ☐

3. (7 points) In $\mathbb{Z}_{11}$, find the value of $[8]^{37}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 10$.

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1. (4 points) $A = \{\text{water}, \text{beer}, \text{wine}\}$ $B = \{\text{ cup}, \text{mug }\}$ $C = \{\text{wine}, (\text{water}, \text{beer})\}$

   $A \times B =$

   $A \cap C =$

2. (4 points) Check the (single) box that best characterizes each item.

   $\emptyset$ is

   an element of $\mathbb{Z}$ ☐ both ☐ a subset of $\mathbb{Z}$ ☐ neither ☐

   $\{1, 2\} \cup \emptyset =$

   $\emptyset$ ☐ $\{(1, \emptyset), (2, \emptyset)\}$ ☐ $\{1, 2, \emptyset\}$ ☐

   $\{\emptyset\}$ ☐ $\{1, 2\}$ ☐ undefined ☐

3. (7 points) In $\mathbb{Z}_{13}$, find the value of $[7]^{21}$. You must show your work, keeping all numbers in your calculations small. **You may not use a calculator.** You must express your final answer as $[n]$, where $0 \leq n \leq 12$.