CS 173, Spring 2015
Examlet 3, Part B

NETID:

FIRST:

LAST:

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

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

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

   $A \cap B =$

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

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

   If $x \in A \cap B$,   true for all sets A and B $\square$ true for some sets A and B $\square$
   then $x \in A$.   false for all sets A and B $\square$

3. (7 points) In $\mathbb{Z}_{11}$, find the value of $[6]^6 + [5]^3$. 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 $0 \leq n \leq 10$.

CS 173, Spring 2015
Examlet 3, Part B

NETID:

FIRST:

LAST:

Discussion: Monday 9 10 11 12 1 2 3 4 5

1. (4 points) $A = \{\text{fox, tiger, wolf}\}$ $B = \{3, 4\}$ $C = \{6, 7, 8\}$

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

$\{p + q \mid p \in \mathbb{Z}, \ q \in \mathbb{Z}, \ 1 \le p \le 3 \text{ and } 1 \le q \le 3\} =$

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

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

true for all sets A ☐   true for some sets A ☐

false for all sets A ☐

$\emptyset$ is

an element of $\mathbb{Z}$ ☐   a subset of $\mathbb{Z}$ ☐

both ☐   neither ☐

3. (7 points) In $\mathbb{Z}_{11}$, find the value of $[8]^{22}$. 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 $0 \le n \le 10$.

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1. (4 points) $A = \{\text{fox}, \text{cat}\}$ $B = \{\text{cat}, \text{mouse}\}$

   $A \cap B =$

   $\{p + q^2 \mid p \in \mathbb{Z}, \ q \in \mathbb{Z}, \ 1 \leq p \leq 2 \text{ and } 1 \leq q \leq 3\} =$

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

   $\emptyset \times \emptyset =$

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

   $|A - B| = |A| - |B|$ true for all sets A ☐   true for some sets A ☐

   false for all sets A ☐

3. (7 points) In $\mathbb{Z}_9$, find the value of $[5]^{21}$. 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 $0 \leq n \leq 8$.

CS 173, Spring 2015
Examlet 3, Part B

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FIRST:

LAST:

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

   $B \times A =$

   $A \cap C =$

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

   Sets A and B are disjoint

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

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

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

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

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 $0 \leq n \leq 12$.

CS 173, Spring 2015
Examlet 3, Part B

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LAST:

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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 ☐

    $\emptyset \in A$ 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 $[7]^{15}$. 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 $0 \leq n \leq 10$.

CS 173, Spring 2015
Examlet 3, Part B

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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.

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

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

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

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

   true for some sets A and B ☐

3. (7 points) In $\mathbb{Z}_{13}$, find the value of $[7]^{18}$. 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 $0 \leq n \leq 12$.