Национальный исследовательский Университет ИТМО
Мегафакультет информационных и трансляционных технологий
Факультет инфокоммуникационных технологий

Дискретная математика

Домашняя работа №1
"Теория множеств"

Работу выполнил:
П.А. Ингеройнен
Группа: К3220
Преподаватель:
П.А. Гилев

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A = {1, 2, 3, 4, 5}; B = {2, 4, 6, 8}; C = {7, 3, 2, 1}
$\overline{A} = \{6, 7, 8\}; \overline{B} = \{1, 3, 5, 7\}$

1. $A \backslash (B \cup C) = (A \backslash B) \cap (A \backslash C)$
   $A \backslash (B \cup C) = \{1, 2, 3, 4, 5\} \backslash \{1, 2, 3, 4, 5, 6, 7, 8\} = \mathbf{\{5\}}$
   $(A \backslash B) \cap (A \backslash C) = \{1, 2, 3, 5\} \cap \{4, 5\} = \mathbf{\{5\}}$
   $\mathbf{\{5\} = \{5\}}$

2. $A \backslash (B \cap C) = (A \backslash B) \cup (A \backslash C)$
   $A \backslash (B \cap C) = \{1, 2, 3, 4, 5\} \backslash \{2\} = \mathbf{\{1, 3, 4, 5\}}$
   $(A \backslash B) \cup (A \backslash C) = \{1, 3, 5\} \cup \{4, 5\} = \mathbf{\{1, 3, 4, 5\}}$
   $\mathbf{\{1, 3, 4, 5\} = \{1, 3, 4, 5\}}$

3. $A \backslash (A \backslash B) = (A \cap B)$
   $A \backslash (A \backslash B) = \{1, 2, 3, 4, 5\} \backslash \{1, 3, 5\} = \mathbf{\{2, 4\}}$
   $(A \cap B) = \mathbf{\{2, 4\}}$
   $\mathbf{\{2, 4\} = \{2, 4\}}$

4. $A \backslash B = A \backslash (A \cap B)$
   $A \backslash B = \mathbf{\{1, 3, 5\}}$
   $A \backslash (A \cap B) = \{1, 2, 3, 4, 5\} \backslash \{2, 4\} = \mathbf{\{1, 3, 5\}}$
   $\mathbf{\{1, 3, 5\} = \{1, 3, 5\}}$

5. $A \cap (B \backslash C) = (A \cap B) \backslash (A \cap C)$
   $A \cap (B \backslash C) = \{1, 2, 3, 4, 5\} \cap \{4, 6, 8\} = \mathbf{\{4\}}$
   $A \backslash (A \cap B) = \{2, 4\} \cap \{1, 2, 3\} = \mathbf{\{4\}}$
   $\mathbf{\{4\} = \{4\}}$

6. $(A \cap B) \backslash (A \cap C) = (A \cap B) \backslash C$
   $(A \cap B) \backslash (A \cap C) = \{2, 4\} \backslash \{1, 2, 3\} = \mathbf{\{4\}}$
   $(A \cap B) \backslash C = \{2, 4\} \backslash \{7, 3, 2, 1\} = \mathbf{\{4\}}$
   $\mathbf{\{4\} = \{4\}}$

7. $A \cap (B \backslash C) = (A \cap B) \backslash C$
   $A \cap (B \backslash C) = \{1, 2, 3, 4, 5\} \cap \{4, 6, 8\} = \mathbf{\{4\}}$
   $(A \cap B) \backslash C = \{2, 4\} \backslash \{7, 3, 2, 1\} = \mathbf{\{4\}}$
   $\mathbf{\{4\} = \{4\}}$

8. $(A \backslash B) \backslash C = (A \backslash C) \backslash (B \backslash C)$
   $(A \backslash B) \backslash C = \{1, 3, 5\} \backslash \{7, 3, 2, 1\} = \mathbf{\{5\}}$
   $(A \backslash C) \backslash (B \backslash C) = \{4, 5\} \backslash \{4, 6, 8\} = \mathbf{\{5\}}$
   $\mathbf{\{5\} = \{5\}}$

9. $A \cup B = A \cup (B \backslash A)$
   $A \cup B = \mathbf{\{1, 2, 3, 4, 5, 6, 8\}}$
   $A \cup (B \backslash A) = \{1, 2, 3, 4, 5\} \cup \{6, 8\} = \mathbf{\{1, 2, 3, 4, 5, 6, 8\}}$
   $\mathbf{\{1, 2, 3, 4, 5, 6, 8\} = \{1, 2, 3, 4, 5, 6, 8\}}$

10. $(A \cap B) \cup (A \cap \overline{B}) = A$
    $(A \cap B) \cup (A \cap \overline{B}) = \{2, 4\} \cup \{1, 3, 5\} = \mathbf{\{1, 2, 3, 4, 5\}}$
    $A = \mathbf{\{1, 2, 3, 4, 5\}}$
    $\mathbf{\{1, 2, 3, 4, 5\} = \{1, 2, 3, 4, 5\}}$

11. $(A \cup B) \cap (A \cup \overline{B}) = A$
$(A \cup B) \cap (A \cup \overline{B}) = \{1, 2, 3, 4, 5, 6, 8\} \cap \{1, 2, 3, 4, 5, 7\} = \mathbf{\{1,\ 2,\ 3,\ 4,\ 5\}}$
$A = \mathbf{\{1,\ 2,\ 3,\ 4,\ 5\}}$
$\mathbf{\{1,\ 2,\ 3,\ 4,\ 5\}} = \mathbf{\{1,\ 2,\ 3,\ 4,\ 5\}}$

12. $(\overline{A} \cup B) \cap A = (A \cap B)$
$(\overline{A} \cup B) \cap A = \{2, 4, 6, 7, 8\} \cap \{1, 2, 3, 4, 5\} = \mathbf{\{2,\ 4\}}$
$A = \mathbf{\{2,\ 4\}}$
$\mathbf{\{2,\ 4\}} = \mathbf{\{2,\ 4\}}$

13. $(A \cup B) \backslash C = (A \backslash C) \cup (B \backslash C)$
$(A \cup B) \backslash C = \{1, 2, 3, 4, 5, 6, 8\} \backslash \{7, 3, 2, 1\} = \mathbf{\{\ 4,\ 5,\ 6,\ 8\}}$
$(A \backslash C) \cup (B \backslash C) = \{4, 5\} \cup \{4, 6, 8\} = \mathbf{\{4,\ 5,\ 6,\ 8\}}$
$\mathbf{\{4,\ 5,\ 6,\ 8\}} = \mathbf{\{4,\ 5,\ 6,\ 8\}}$

14. $A \backslash (B \backslash C) = (A \backslash B) \cup (A \cap C)$
$A \backslash (B \backslash C) = \{1, 2, 3, 4, 5\} \backslash \{4, 6, 8\} = \mathbf{\{1,\ 2,\ 3,\ 5\}}$
$(A \backslash B) \cup (A \cap C) = \{1, 3, 5\} \cup \{1, 2, 3\} = \mathbf{\{1,\ 2,\ 3,\ 5\}}$
$\mathbf{\{1,\ 2,\ 3,\ 5\}} = \mathbf{\{1,\ 2,\ 3,\ 5\}}$