CSCI 301 Formal languages and Functional Programming
Midterm Exam Question 12
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Question 12

Prove $A - (B \cap C) = (A - B) \cup (A - C)$ for sets A, B, C

$$\begin{aligned} A - (B \cap C) &= \{x : x \in A \wedge x \notin (x \in B \wedge x \in C\} \\ &= \{x : x \in A \wedge (x \notin B \vee x \notin C)\} \\ &= \{x : (x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)\} \end{aligned}$$

$$(A - B) \cup (A - C) = \{x : (x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)\}$$

$$\{x : (x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)\} = \{x : (x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)\}$$
$$\therefore A - (B \cap C) = (A - B) \cup (A - C)$$