Math-42 Sections 01, 02, 05

Homework #7 Solutions

Problem

1. Prove: $A - (B \cap C) = (A - B) \cup (A - C)$

$$
\begin{aligned}
x \in A - (B \cap C) &\iff x \in A \text{ and } x \notin (B \cap C) \\
&\iff x \in A \text{ and } x \in \overline{B \cap C} \\
&\iff x \in A \text{ and } x \in \bar{B} \cup \bar{C} \\
&\iff x \in A \text{ and } (x \in \bar{B} \text{ or } x \in \bar{C}) \\
&\iff (x \in A \text{ and } x \in \bar{B}) \text{ or } (x \in A \text{ and } x \in \bar{C}) \\
&\iff (x \in A \text{ and } x \notin B) \text{ or } (x \in A \text{ and } x \notin C) \\
&\iff x \in (A - B) \text{ or } x \in (A - C) \\
&\iff x \in (A - B) \cup (A - C)
\end{aligned}
$$

2. Show the corresponding region on a Venn diagram.