Quiz 4

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1.Let $A = \{x|2 < x < 5\}$, $B = \{x|4 \leq x \leq 7\}$ and $C = \{x|2 \leq x < 6\}$, where x represents a real number. Determine the sets

$A = \{3, 4\}, B = \{4, 5, 6, 7\}, C = \{2, 3, 4, 5\}$
$(A - C) \cup A = \{3, 4\}$
$(A \cap B) - C = \{\emptyset\}$
$B \cap \overline{\mathrm{C}} = \{6, 7\}$

2. For any sets A, B and C , prove that
$A - (B \cap C) \subseteq (A - B) \cup (A - C)$.

Assume: $x \in A - (B \cap C)$
then: $x \in A \wedge (x \notin B \vee x \notin C)$
then: $(x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)$
then: $(x \in A - B) \vee (x \in A - C)$
then: $x \in (A - B) \cup (A - C)$

Assume: $x \in (A - B) \cup (A - C)$
then: $(x \in A - B) \vee (x \in A - C)$
then: $(x \in A \wedge x \notin B) \vee (x \in A \wedge x \notin C)$
then: $x \in A \wedge (x \notin B \vee x \notin C)$
then: $x \in A - (B \cap C)$

3. Let A and B are the sets . Use the laws from the following table to show that
$\overline{\overline{\mathrm{A}} \cup \overline{\mathrm{B}} - \mathrm{A}} = A$
$\overline{\overline{\mathrm{A}} \cup \overline{\mathrm{B}} - \mathrm{A}}$
$\equiv (A \cap B) - \overline{\mathrm{A}}$
$\equiv (A - \overline{\mathrm{A}}) \cup (B - \overline{\mathrm{A}})$
$\equiv A$ When subtracting the compliment of A from A we are left with just A. When subtracting the compliment of A from B we are left with only elements that are in A. The union between these two differences will then give us A.

4. 1. $a_0 = 1, a_1 = -1, a_2 = 8, a_3 = -27$
   2. $a_0 = 2, a_1 = 2, a_2 = 2, a_3 = 2$

5. 1) $\sum_{k=50}^{100} 4k^2 = 4 * \sum_{k=50}^{100} k^2 = 4 * \sum_{k=1}^{100} k^2 - \sum_{k=1}^{49} k^2 = 4 * (\frac{100*101*201}{6} - \frac{49*50*99}{6})$

2) $\sum_{i=0}^{9} (3^i - 2) = \sum_{i=0}^{9} 3^i - \sum_{i=0}^{9} 2 = \frac{3^{10}-1}{2} - 18$

3) $\sum_{i=8}^{10} 6i + 3 = \sum_{i=8}^{10} 6i + \sum_{i=8}^{10} 3 = 6 * (\frac{10*11}{2} - \frac{7*8}{2}) - 9$

4) $\sum_{i=0}^{10} \frac{1}{2} * -1^i = \frac{1}{2}(\frac{-1^{11}-1}{-2})$