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Discrete Math: Assignment 3

1. a. Enumeration: $\{-1, -3, -5, -7 \ldots\}$

   b. For position $i \in \mathbb{N}^+$, $S_i = -2i + 1$ where $i \in \mathbb{N}^+$

   ie. $S_1 = -2(1)+1 = -1$, $S_2 = -2(2)+1 = -3$, $S_3 = -2(3)+1 = -5$; and so on.

   c. For $k \in S$, $i = -\frac{k-1}{2}$, where position $i \in \mathbb{N}^+$

   ie. $-\frac{(-1)-1}{2} = 1$, $-\frac{(-3)-1}{2} = 2$, $-\frac{(-5)-1}{2} = 3$, and so on.

2. $(A \cup B) - C = (A - C) \cup (B - C)$

Proof	Justification
$(A-C) \cup (B-C)$	Right side of equation
$= \{x \mid x \in (A-C) \cup (B-C)\}$	Convert to set builder notation.
$= \{x \mid x \in (A-C) \vee x \in (B-C)\}$	Definition of $\cup$
$= \{x \mid x \in (A \wedge \neg C) \vee x \in (B \wedge \neg C)\}$	Definition of $-$ (difference)
$= \{x \mid x \in \neg C \wedge x \in (A \vee B)\}$	Distributive Property
$= \{x \mid x \in \neg C \wedge x \in (A \cup B)\}$	Definition of $\cup$
$= \{x \mid x \in (A \cup B) - C\}$	Definition of $-$ (difference)
$(A \cup B) - C$	Convert from set builder notation to get left side of eq.

The justifications show how each step preserves the equality and thus $(A-C) \cup (B-C) = (A \cup B) - C$

Since equality is symmetric, we conclude $(A \cup B) - C = (A-C) \cup (B-C)$. ■