You must work alone on your homework, and homework must be **written legibly**, single-sided on your own lined paper, or **typed**, with the answers clearly labeled and in the sequential order as assigned. You must write your name and university ID number in the upper right-hand corner of your homework. Staple all pages together and be sure that your name appears on every sheet.

1. (-10 points if wrong) Write your name clearly on each page. Write the time and place of Exam 2.

2. (15 points) Suppose \( a_1, a_2, a_3, \ldots \) is a sequence defined as follows:

   \[
   \begin{cases}
   a_1 = 1, & a_2 = 2, & a_3 = 3 \\
   a_k = a_{k-1} + a_{k-2} + a_{k-3} & \text{for all integers } k \geq 4
   \end{cases}
   \]

   Show that: \( \forall k \in \mathbb{Z}^+, \ a_k \leq 2^{k-1} \).

3. (10 points) Prove that \( \emptyset \subseteq A \) for any set \( A \).

4. (75 points) For each of the following say whether it is true or false. If true, prove it. If false, give a specific counterexample.

   (a) \( B - (A \cap C) = (B - A) \cup (B - C) \)

   (b) \( (A \subseteq B) \rightarrow ((A \cup B) \subseteq B) \).

   (c) \( (A \cap B) \cap C \subseteq (A \cup B) \cup C \).

   (d) \( A \cap (B \cap C) \rightarrow (A \cap B) \cup (A \cap C) \).

   (e) \( [(B \cap C) \subseteq A] \rightarrow [(C - A) \cap (B - A) = \emptyset] \).

5. **(No points will be awarded for this assignment unless this is done)** Sign your name to the following honor code statement: “I pledge on my honor that I have not given or received any unauthorized assistance on this assignment”.

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