In each problem below:

- Program Protocol refers to the program defined in the note titled Modeling and Analyzing Authentication Protocols.
- If you answer that the assertion holds, come up with an argument why every state of every evolution satisfies the assertion’s predicate.
- If you answer that the assertion does not hold, come up with a counter-example evolution, i.e., an evolution that ends in a state that does not satisfy the assertion’s predicate.

**Problem 1. [15 points]**

Does assertion \( \text{Inv} B_3 \) hold for program Protocol, where

\[ B_3 : (\exists (A.S) \Rightarrow \psi(A.S)) \]

**Problem 2. [15 points].**

Does assertion \( \text{Inv} B_4 \) hold for Protocol, where

\[ B_4 : \forall (i \in \text{hst.keys}: [B,S] = \text{hst}[i] \Rightarrow ([A,S] \in \text{hst}[0..i-1])) \]