I worked alone without getting any help, except asking questions on Piazza and reading the Notes of this course.

1 Hit or Miss?

(a) Incorrect.

The proof only shows that the proposition is true for all $n \in \mathbb{Z}^+$. However, since the restriction on n is that $n \in \mathbb{R}$, and $n > 0$, only proving that the proposition works for all positive integers is not enough.

Additionally, for a counterexample, consider $n = 0.5$, so n is positive and $n \in \mathbb{R}$. Yet, $n^2 = 0.25 < 0.5 = n$.

Q.E.D.

(b) Correct.

(c) Incorrect.

In order for the principle of mathematical induction to apply, the Inductive Step must show that for all $n, P(n) \implies P(n+1)$, and it claims that $n+1$ can be written as "$a+b$ where $0 < a, b \leq n$." Yet, it only proved one base case where $n = 0$, and the proof breaks when $n = 1$, so for $n = 0 + 1 = 1, n$ couldn't be written as the sum of two positive integers that follows the pattern. Moreover, 1 can't be written as the sum of two positive integers in the first place.

Additionally, for a counterexample, consider $n = 1$, so n is a nonnegative integer. Yet, $2n = 2 \neq 0$.