1. A *majority element* in an array is an element that appears in more than half of the array locations.

Consider the following algorithm that finds a majority element in an array, if one exists.

\[
\text{Majority}(A):
\begin{align*}
c &= 1 \\
m &= A[0] \\
\text{for } i &= 1 \text{ to } \text{len}(A) - 1: \\
\text{if } c &= 0: \\
& \quad m = A[i] \\
& \quad c = 1 \\
\text{else if } A[i] &= m: \\
& \quad c = c + 1 \\
\text{else}: \\
& \quad c = c - 1 \\
\text{return } m
\end{align*}
\]

(a) Give precise preconditions and postconditions for this algorithm.

(b) Write a detailed proof that the algorithm is correct. (This includes, but is not limited to, finding and proving a suitable loop invariant.)