Consider an array $A$ whose elements are all either “black” or “white”. The following algorithm rearranges the elements of $A$ so that every black appears before every white.

1: $j = 0$
2: $i = 0$
3: while $i < \text{len}(A)$ do
4:  if $A[i] == \text{“black”}$ then
6:  $j = j + 1$
7:  end if
8:  $i = i + 1$
9: end while

1. Write down preconditions and postconditions for this algorithm, based on the description above.
2. Prove that the algorithm is partially correct– this will involve finding a suitable loop invariant.
3. Prove that the algorithm terminates.