Loop Invariant: After each iteration of the for loop of lines 2 - 3, *sum* contains the sum of elements in the sub-array $A[1:i]$

Initialisation: Before the first iteration, *sum* holds 0. Thus it holds the sum of the elements of the empty sub-array $A[1:0]$.

Maintenance: Before the i^{th} iteration, let us say *sum* contains the sum of the elements from $A[1:i-1]$. After the i^{th} iteration, it holds that value plus $A[i]$, thus it holds the sum of values of the sub-array $A[1:i]$.

Termination: We see that i goes from 1 to n, which means the for loop executes a total of nth times. thus after the n_{th} iteration, *sum* holds the value of the array $A[1:n]$