

Answer on Question #53136 – Math – Algorithms | Quantitative Methods

How many elementary operations are used in the following algorithm?

Step 1 Set $a=1$, $b=1$, $c=2$, and $k=1$.

Step 2 while k (a) Replace c with $a+b$

(b) Replace a with b

(c) Replace b with c

(d) Replace k with $k+1$

endwhile

Step 3 Print b .

Solution

4 types of elementary operations (assigning values, comparing k with 0, addition and print), and infinite number of them (because condition for endwhile will never be false).

If condition would be " $\text{while } k \leq N$ ", it will take 4 operations in step 1,

$N \cdot (1 \text{ comparison} + 2 \text{ additions} + 4 \text{ replacing}) + 1 \text{ comparison} = 7N + 1$ operations in step 2 and 1 operation (print) in step 3.

Thus, it will be $(7N + 6)$ elementary operations in total.