$\boxed{\text{Maintenance:}}$ • Let, before the start of the loop iteration when $j=K$, the loop invariant holds. $\therefore \forall x, 0 \leq x < j, x \in N$, $c[i][x] = a[i][x] + b[i][x]$

Now, on line 6, $c[i][K]$ stores the sum of $a[i][K]$ and $b[i][K]$. In the next iteration, $j=K+1$. It's easy to see that now, the loop invariant holds $\because \forall x, 0 \leq x < j$, $c[i][x] = a[i][x] + b[i][x]$

$\boxed{\text{Termination:}}$ The inner loop terminates when $j = cols$. $\therefore$ By loop invariant,

$\forall x, 0 \leq x \leq cols-1, x \in N, c[i][x] = a[i][x] + b[i][x]$.

$\therefore$ The sum of the corresponding matrix elements of a and b for row i has been correctly computed and stored in the ith row of c. □

Outer loop invariant

• Just before the start of the loop ~~iteration~~ iteration when $i=l$, where $0 \leq l < rows$, all the corresponding elements of a and b for rows 0 to $(l-1)$ have been added and stored in matrix c.

$\boxed{\text{Initialization:}}$ $i=0$. The row indices of 0 to $-1$ doesn't make sense. $\therefore$ The claim trivially holds.

$\boxed{\text{Maintenance:}}$ $i=l$. Before the start of this iteration, let the loop invariant holds. $\therefore \forall x \forall y$, where $0 \leq x < l$ and $0 \leq y < cols$, $\boxed{c[x][y] = a[x][y] + b[x][y]}$. When $i=l$, by the correctness proof of inner loop done above, we know that $\forall y, 0 \leq y < cols$, $\boxed{c[l][y] = a[l][y] + b[l][y]}$. Before the start of the next iteration, $i = l+1$. $\therefore$ Loop invariant still holds and its easy to see.

$\boxed{\text{Termination:}}$ The outer loop terminates when $i = rows$. $\therefore$ By loop invariant, $\forall x \forall y$, $0 \leq x < rows$, $0 \leq y < cols$,