$\therefore$ $\forall x, x \in N, 0 \leq x < l$, $c[i][j] \mathrel{+}= a[i][x] * b[x][j]$ holds

- Now, when $K = l$, by line 8, $c[i][j] = c[i][j] + a[i][l] * b[l][j]$.
- Now, the loop variable K gets updated to $(l+1)$. It's easy to see that

$\forall x, x \in N, 0 \leq x < l+1$, $c[i][j] \mathrel{+}= a[i][x] * b[x][j]$ holds.

$\therefore$ Loop invariant still holds

$\boxed{\text{Termination:}}$ The loop terminates when $K =$ MAX_SIZE.

$\therefore$ By loop invariant, $\boxed{c[i][j] = \sum_{K=0}^{\text{MAX\_SIZE}-1} a[i][K] * b[K][j]}$. $\therefore$ The element of matrix c at row i, column j stores the sum of the products of row i of matrix a and column j of matrix b's corresponding elements. $\square$

This is in accordance to definition.

Loop (j) invariant

- Just before the start of the iteration when $j = m$, the elements of matrix c in row i, from indices 0 to $m-1$, have been correctly computed.

$\boxed{\text{Initialization:}}$ $j = 0$. $\because m = 0$, the indices 0 to -1 doesn't make sense.

$\therefore$ The loop invariant trivially holds.

$\boxed{\text{Maintenance:}}$ Let, the loop invariant hold just before when $j = m$. $\therefore$ $\forall x, x \in N$, $0 \leq x < m$, the matrix element $c[i][x]$ is correctly computed. That means, according to correctness of Loop(K), $\boxed{c[i][x] = \sum_{K=0}^{\text{MAX\_SIZE}-1} a[i][K] * b[K][x]}$

- Now, $j = m$. On line 6, we initialize $c[i][m]$ to 0. By correctness of Loop(K), $\boxed{c[i][m] = \sum_{K=0}^{\text{MAX\_SIZE}-1} a[i][K] * b[K][x]}$. j now gets updated to $(m+1)$.

It's easy to see that $\forall x, x \in N, 0 \leq x < m+1$, the matrix element $c[i][x]$ is correctly computed.