Floyd-Warshall Algorithm

After we compute all entries of the matrix M with $k = 0, 1, \ldots, K-1$, can we compute the entries with $k = K$?

Consider a shortest path P from v_i to v_j with $MAX(P) \leq K$.
Cases:

- P satisfies $MAX(P) \leq K-1$. Then $Cost(P) = M[i, j, K-1]$.
- P satisfies $MAX(P) = K$.
  Hence $v_K \in P$. Analyzing this is a bit more complicated, but we will show the path P satisfies
  $Cost(P) = M[i, K, K-1] + M[K, j, K-1]$.