Question 1

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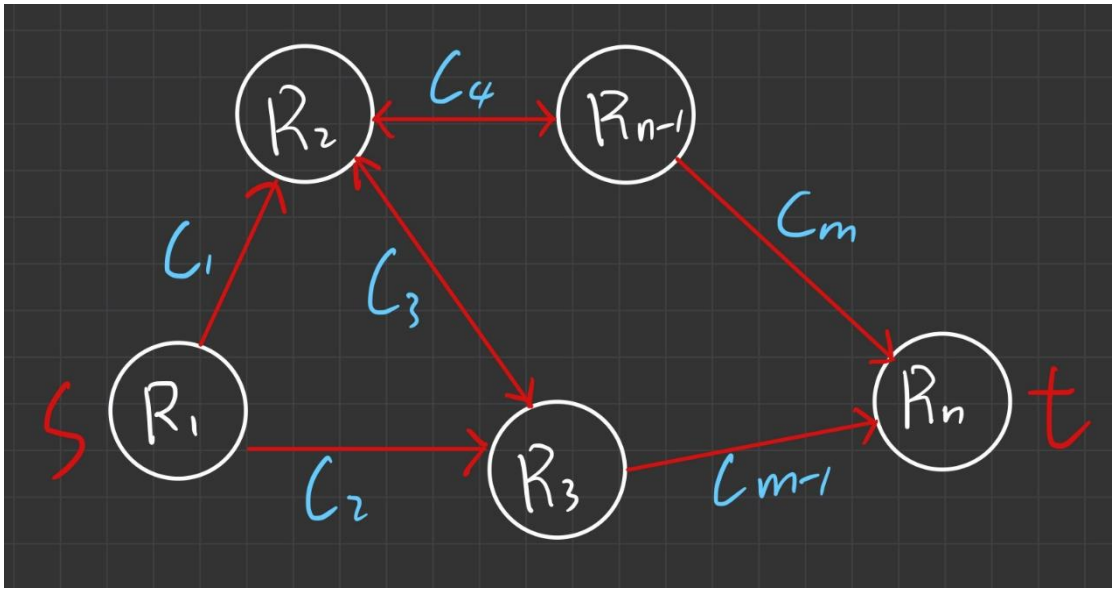
First, we transform the problem into a graph, which can be obtained by taking the rooms as vertices, the corridors as edges and the limit on the number of people that can pass through the corridors as the weights of the edges. A graph like the one below can be obtained.



Then we simply treat the first room as the source and the nth room as the sink and run the Edmonds-Karp algorithm on this graph to find the maximum flow.

The maximum flow we found is the number of students in the largest wave. Then divide this number by the number of students and round up to the nearest whole number ($\left\lceil \frac{x}{\max flow} \right\rceil$) to get the minimum number of waves that must be formed.

Transforming the problem into a graph takes $O(n+m)$ time complexity,

then running the Edmonds-Karp algorithm takes $O(|n||m|^2)$ time complexity, and the final part of the computed result takes $O(1)$. So, the total time complexity of the problem is $O(|n||m|^2)$ which meets the polynomial time requirement of the question.