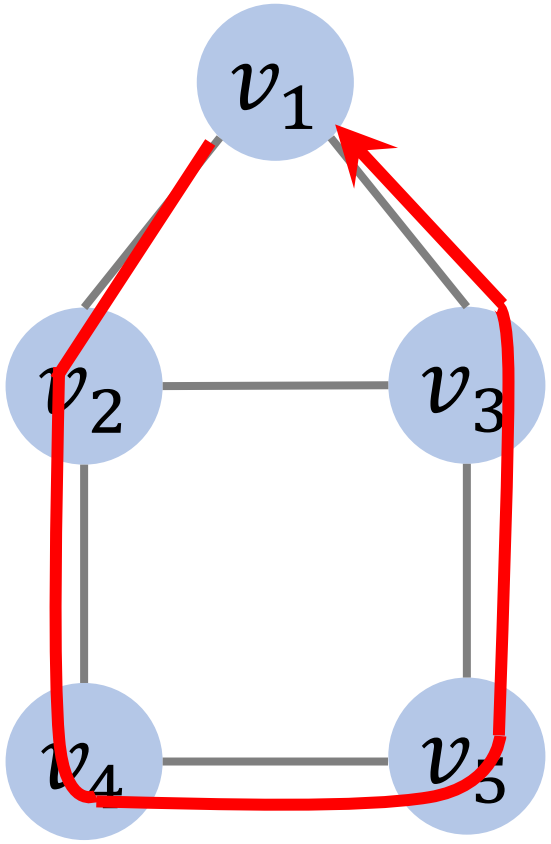
Hamiltonian Cycle

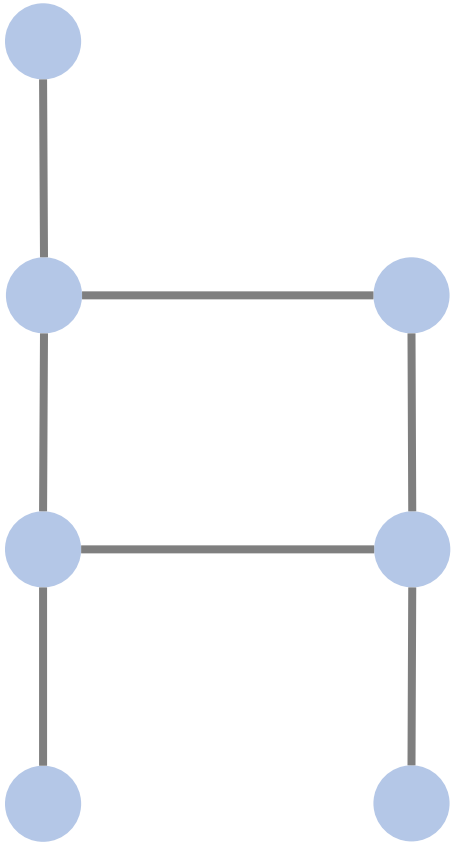
Shusen Wang

Hamiltonian Cycle



- The input is an undirected graph.
- Hamiltonian cycle is a path that
  - visits each vertex exactly once;
  - starts and ends at the same vertex.

Hamiltonian Cycle



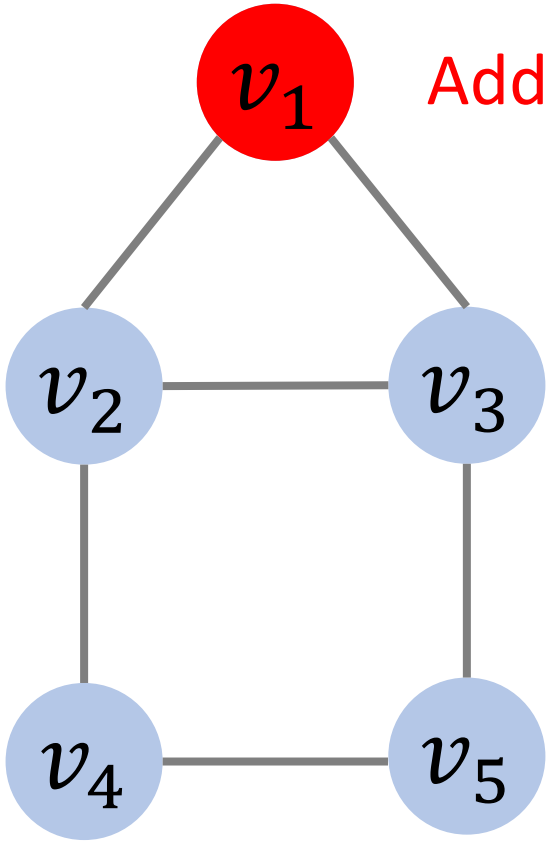
- The input is an undirected graph.
- Hamiltonian cycle is a path that
  - visits each vertex exactly once;
  - starts and ends at the same vertex.
- Hamiltonian cycle may not exist.

Find a Hamiltonian Cycle

Backtracking Algorithm

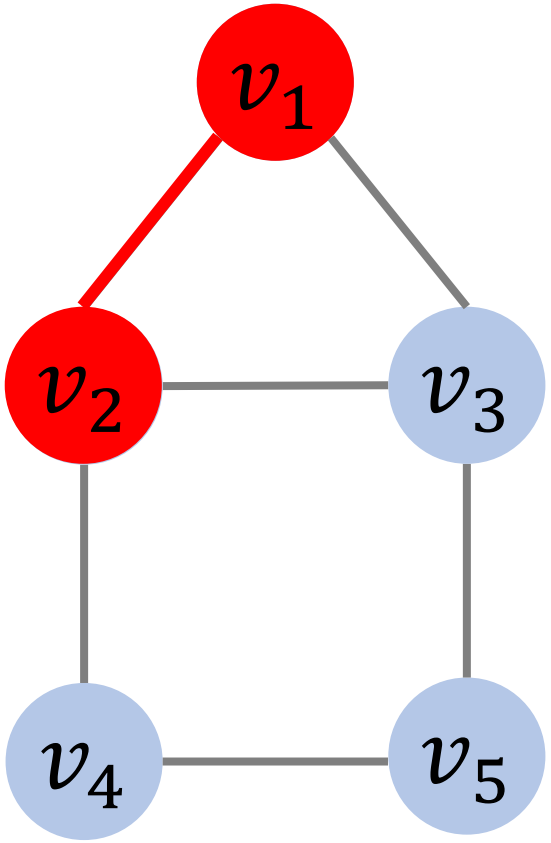
- Add any vertex to the path as the source.
- Add vertices one by one to the path.
  - The next vertex is adjacent to the current vertex.
  - The next vertex is not on the path.
- Backtracking if the path does not lead to the source.

Backtracking Algorithm

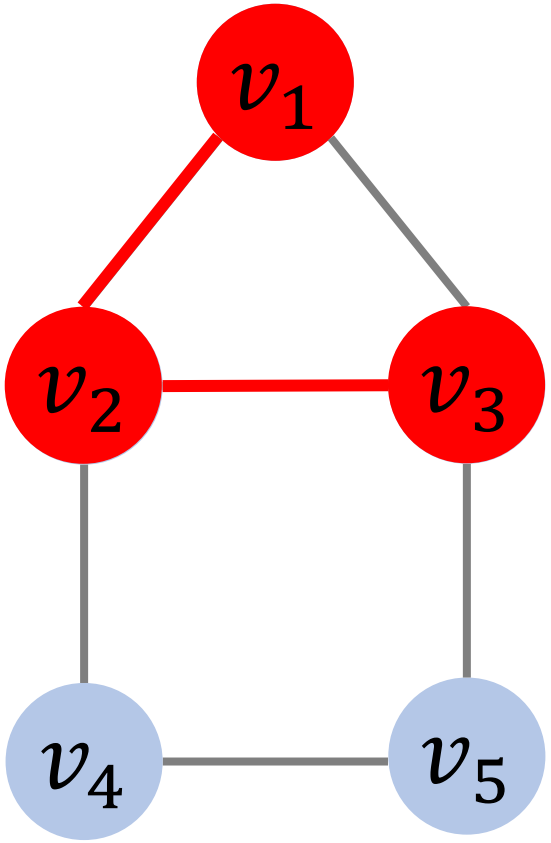


Add an arbitrary vertex as the source.

Backtracking Algorithm



Backtracking Algorithm



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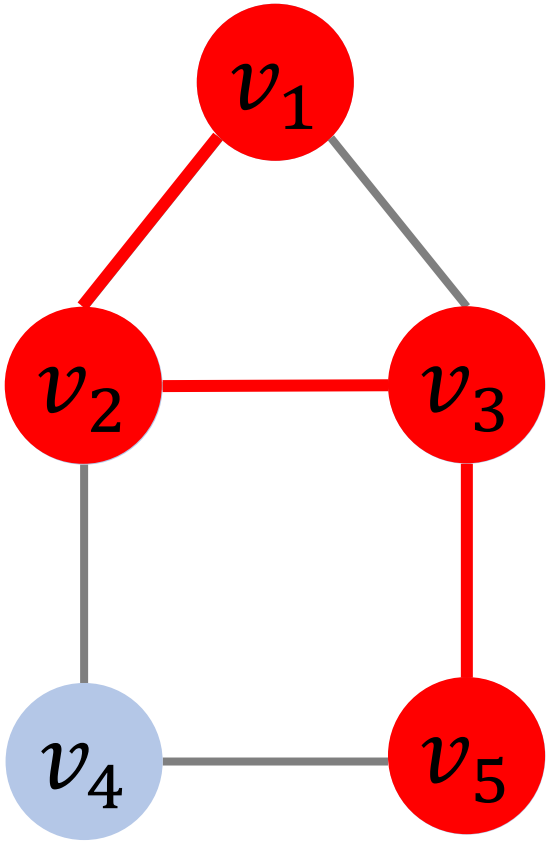
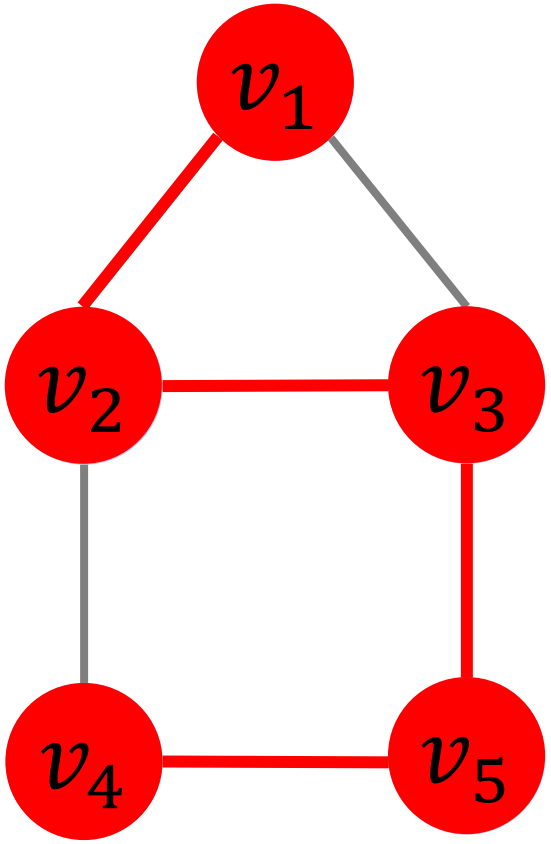
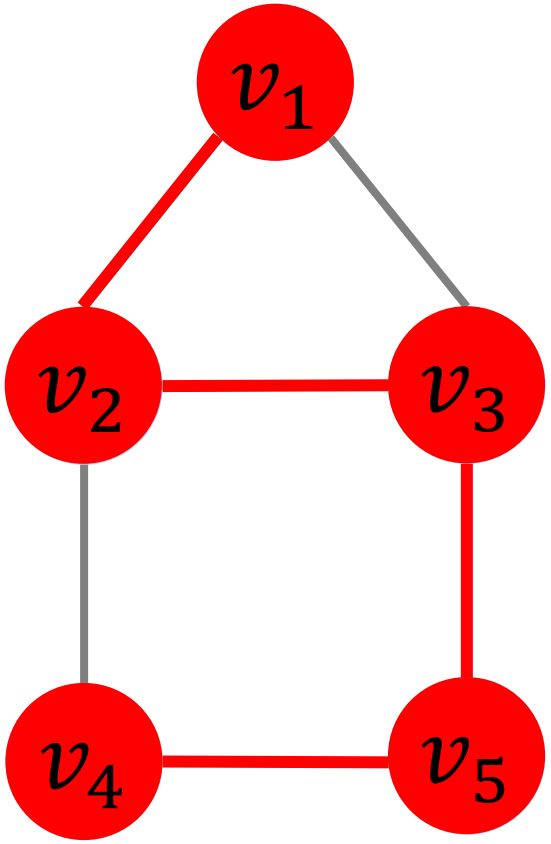
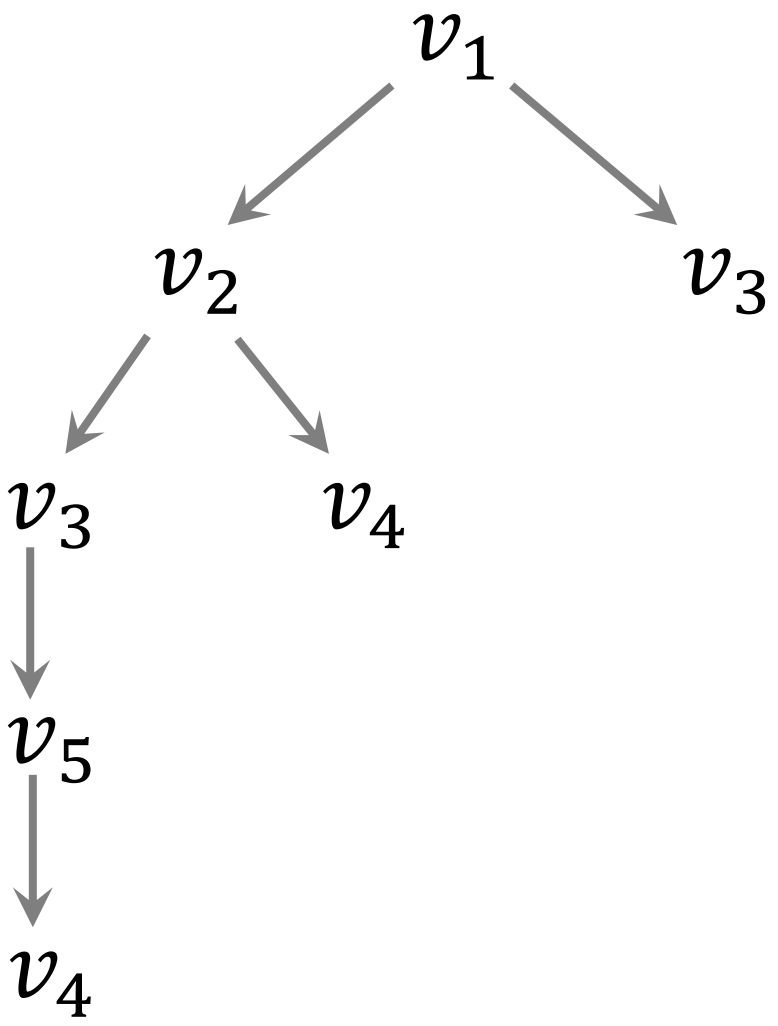


Backtracking Algorithm



Backtracking Algorithm





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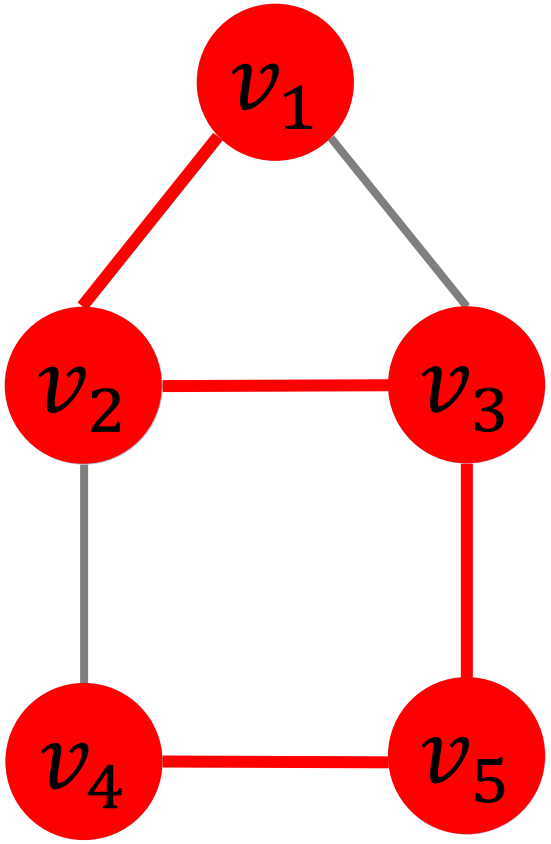

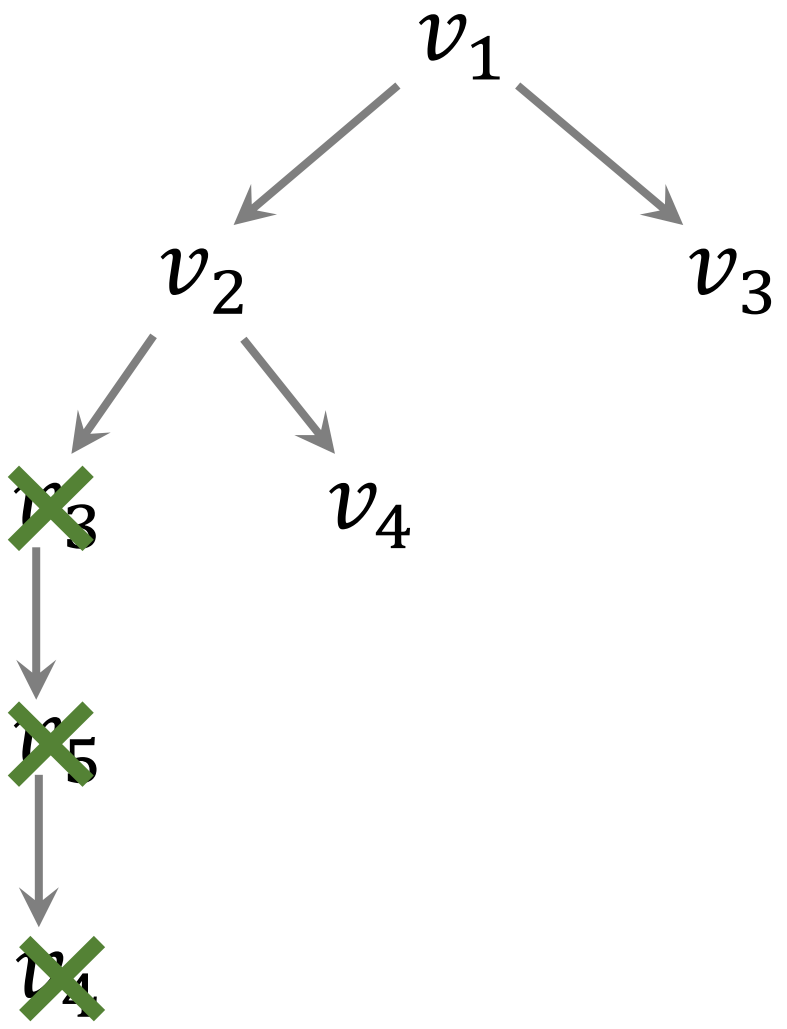

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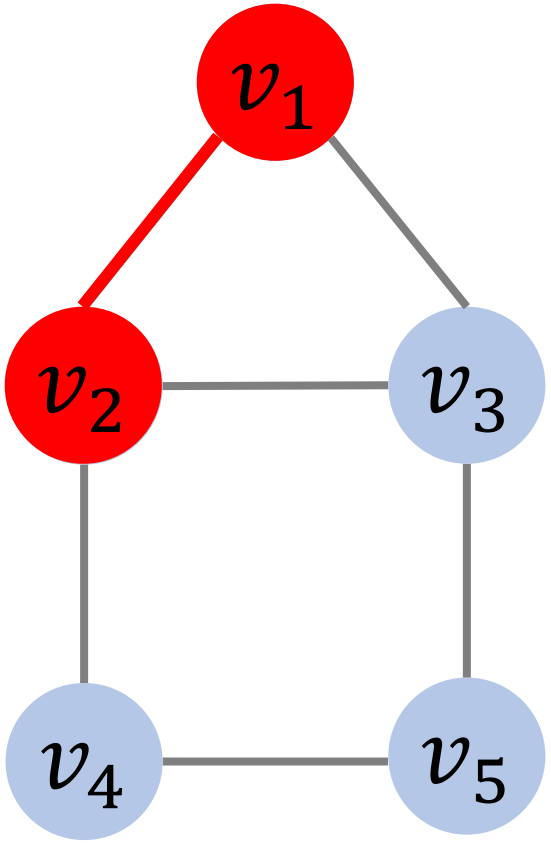

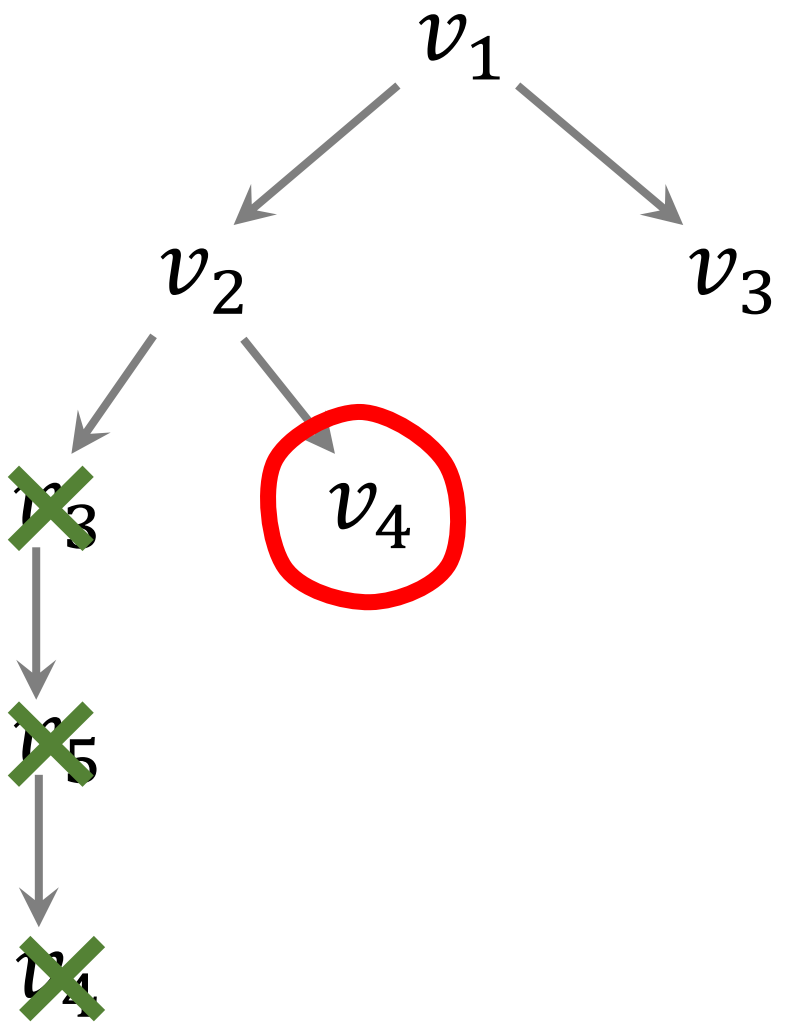

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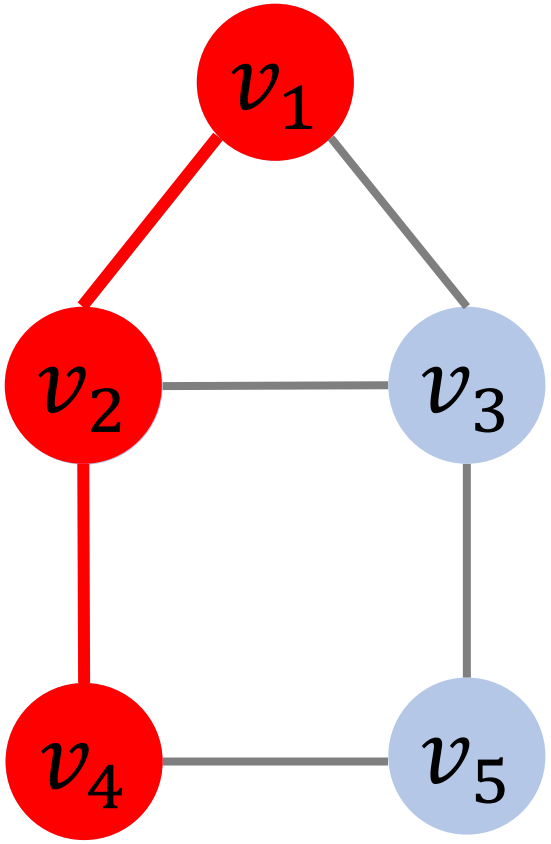

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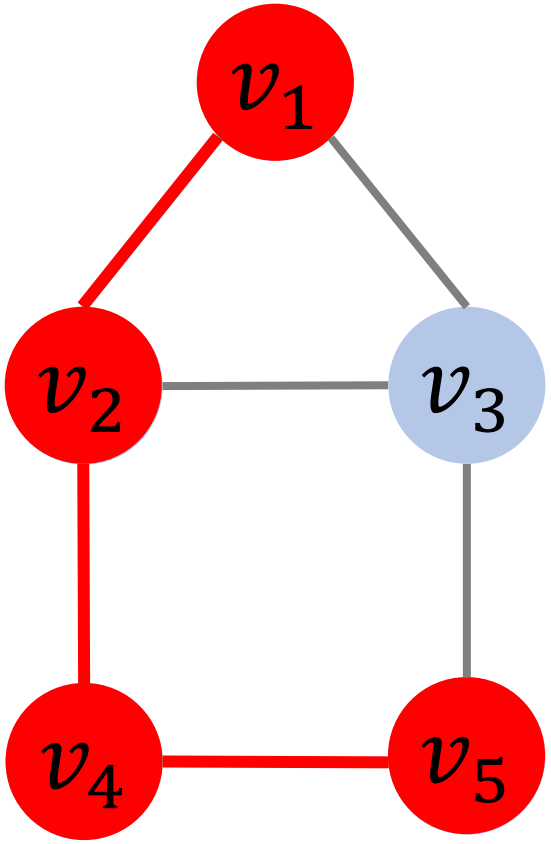

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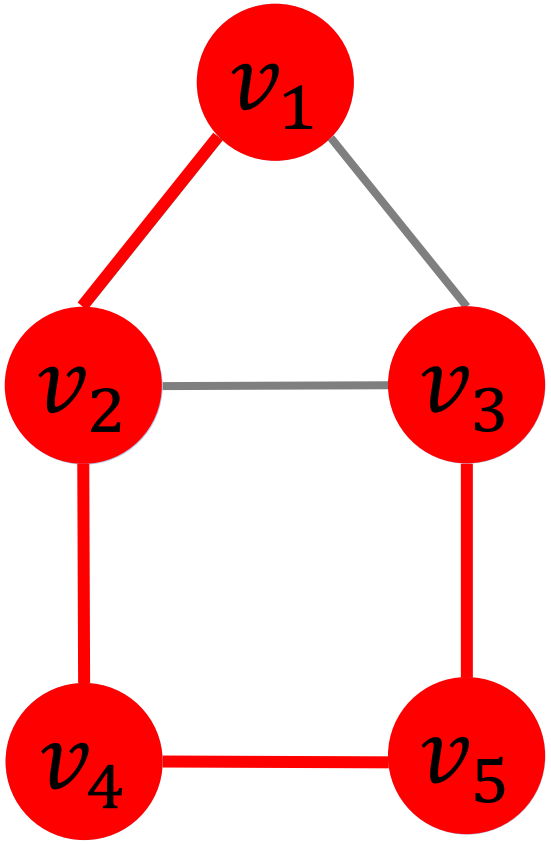

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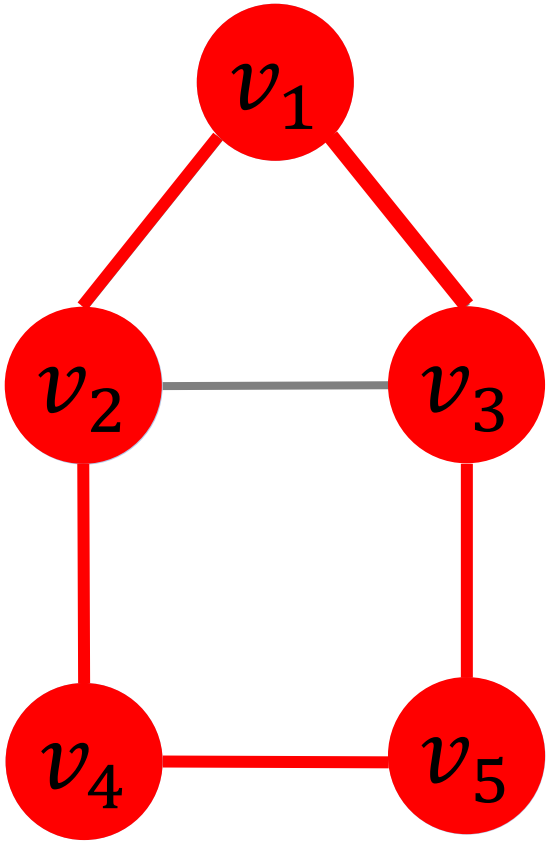
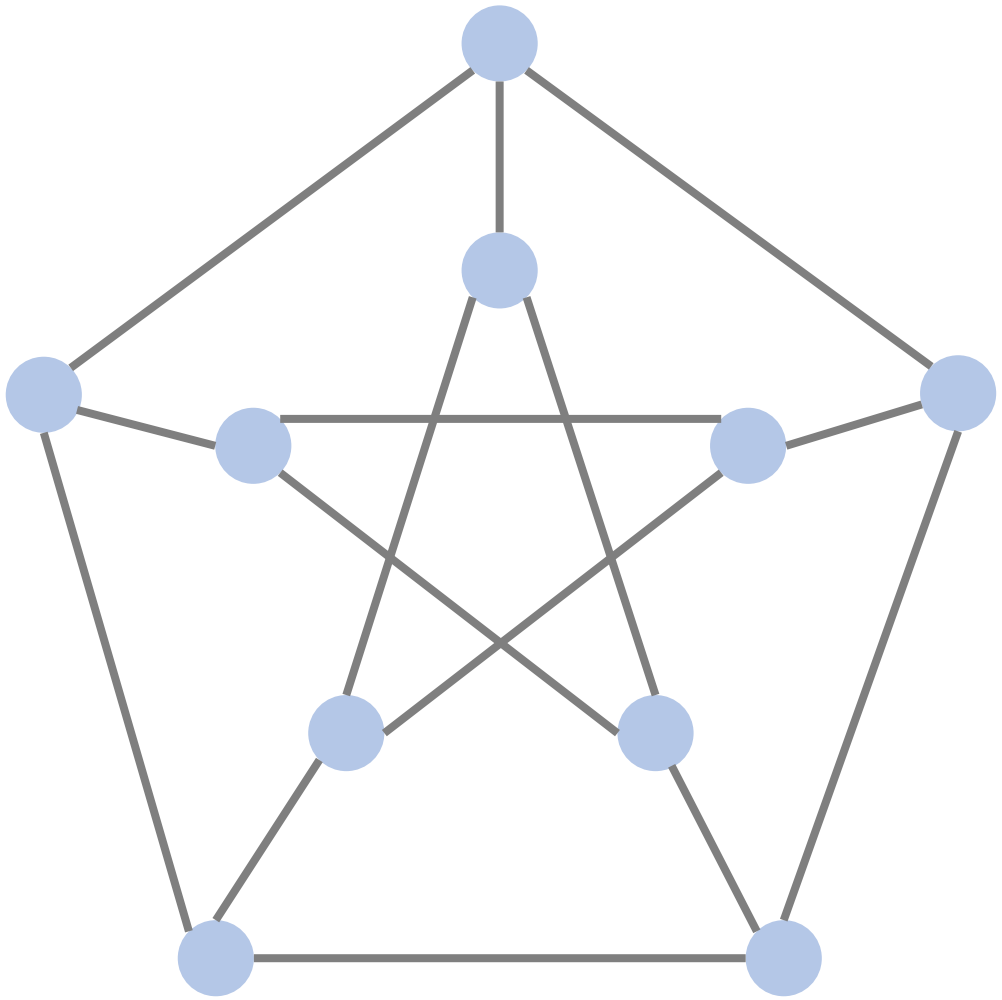


Questions

Question: Does Hamiltonian path exist?



Thank You!