

TRAVELING SALESMAN PROBLEM

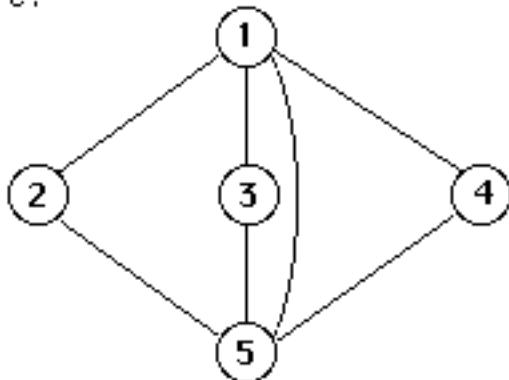
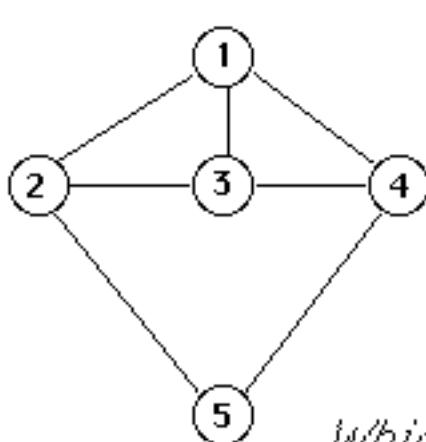


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A **Hamiltonian Circuit** of a graph or network is a path which visits each node *exactly once* and terminates at the initial node.

A **Hamiltonian Graph** is a graph for which there is a Hamiltonian circuit.



*Which of these graphs
is Hamiltonian?*

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Traveling Salesman Problem

The Traveling Salesman Problem (**TSP**) is that of finding the *shortest* Hamiltonian circuit (*tour*) in a Hamiltonian network.

*Usually, the problem is posed for a *complete* network, which is, of course, always Hamiltonian.*

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A TSP in a complete network can be further classified as:

- Symmetric Traveling Salesman Problem

Complete, Undirected Network

$$d_{ij} = d_{ji} \quad \forall i \& j$$

- Asymmetric Traveling Salesman Problem

Complete, Directed Network

$$d_{ij} \neq d_{ji} \quad \forall i \& j$$

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Applications

Integer & Mixed-Integer Models

Branch-&-Bound Algorithms

Heuristic Algorithms

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