

Explain

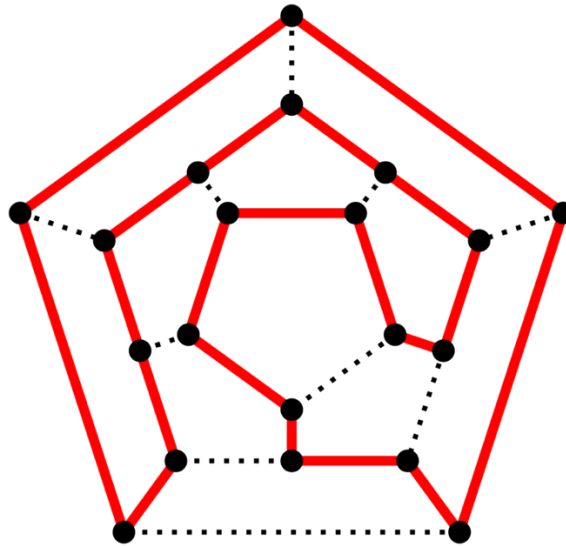
Resume: explain the connection between the Hamiltonian path problem, the Eulerian path problem, and line graphs, with your words and images.

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1. What does Hamiltonian mean?

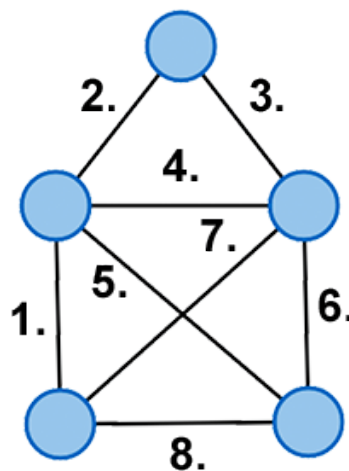
A Hamiltonian graph is a graph which we can parse by passing by every vertex, once time each. A picture illustrating better than any word, below a Hamiltonian graph, filled thanks to a Hamiltonian path:



Each point is passed once time, and the path is closed (it means that the beginning vertex is also the end vertex).

2. What does Eulerian mean?

A Eulerian graph is a graph that we can traverse by passing a single time each edge. Here is an illustration of this type of graph:



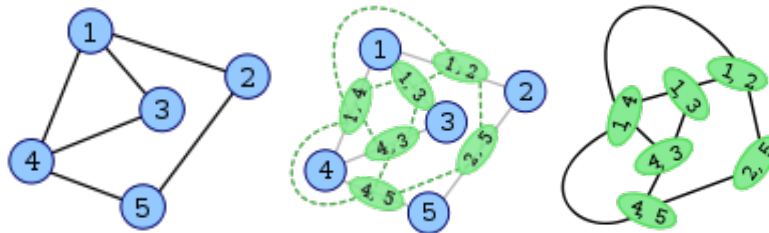
Each segment is used once time, and we see that the whole graph is parsed.

3. What is a line graph?

A line graph is a graph built following these 2 rules:

- each vertex of this graph represents an edge of the original graph.
- two vertices of this graph are adjacent if their corresponding edges share a common edge in the original graph.

Here is an illustration of this line graph build:



4. What is their relation?

When we consider a graph, which is Eulerian or Hamiltonian, and we build its line graph, we may notice this line graph doesn't have the same type. In other words, a Eulerian graph will have a Hamiltonian line graph, as much as a Hamiltonian graph will have a Eulerian line graph. But the reverse is not true: a Eulerian or Hamiltonian line graph will not only have an original graph in the contrary type.