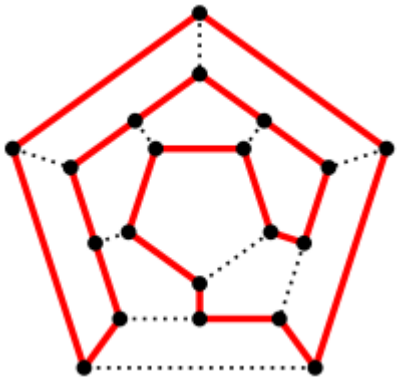
Basic

(1) Are the following problems in **PSPACE**? Why or why not?

- SAT
- SSP
- $PATH$
- $HAMPATH = \{\langle G, s, t\rangle \mid G \text{ is a directed graph with a Hamiltonian path from } s \text{ to } t\}$
- $HAMCYCLE = \{\langle G\rangle \mid G \text{ is a directed graph with a Hamiltonian cycle}\}$

  Recall that "Hamiltonian cycle" means a "path that starts at a vertex, visits every vertex of G once, then returns back to the start vertex."

  Example:



(2) Show that the language of all binary strings with equal 0's and 1's is in **L**.

(3) Show that testing for balanced brackets is in **L**.

The corresponding language looks like:

$$\{\varepsilon, (), (()), ()(), ((())), ()()(), (())(), ()(()), \ldots\}$$

(4) Show that the language of palindromes over the alphabet $\{0, 1\}$ is in **L**.

Hint: simulate a **for**-loop that keeps track of the indices of the symbols that need to be compared.