Planar graph

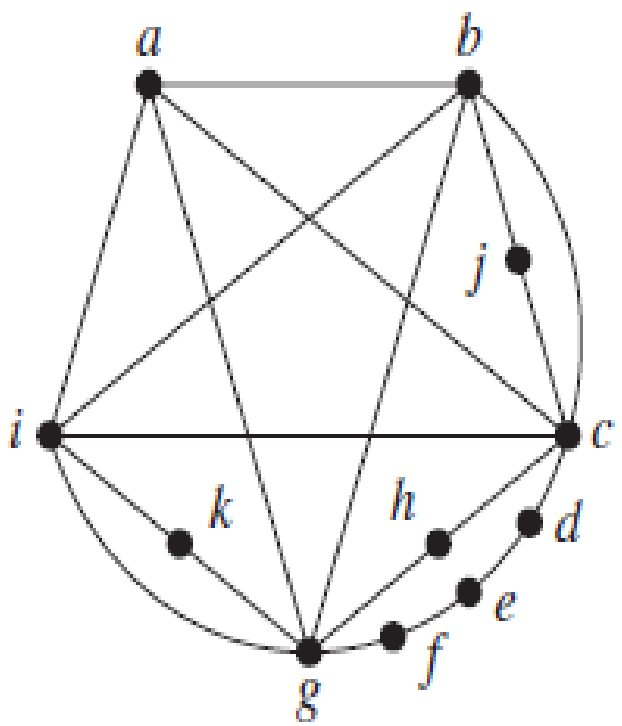
Kuratowski's Theorem

- We have seen that $K3,3$ and $K5$ are not planar. Clearly,

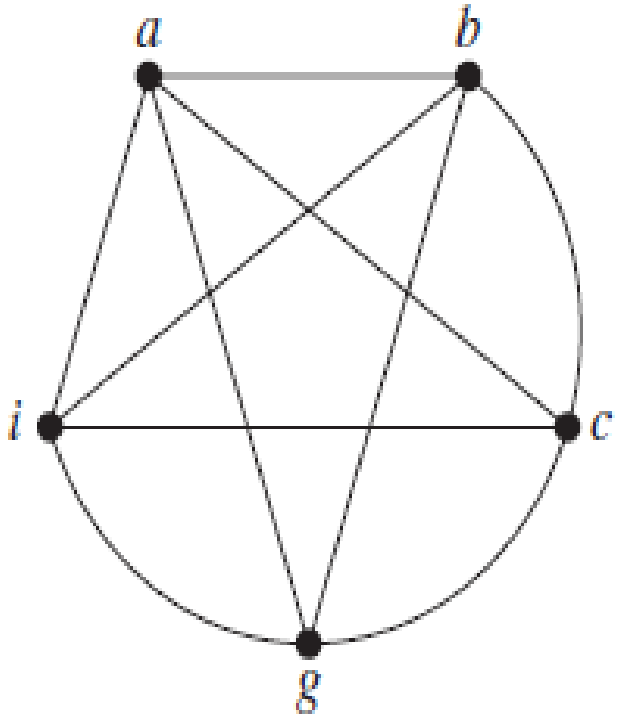
a graph is not planar if it contains either of these two graphs as a subgraph.

example

Graph G is no-planar since it has k5 as subgraph.



G



K_5

Exercise 1.

Show that $K5$ is nonplanar.

Exercise 2.

show that $K_{3,3}$ is nonplanar.

Exercise 3.

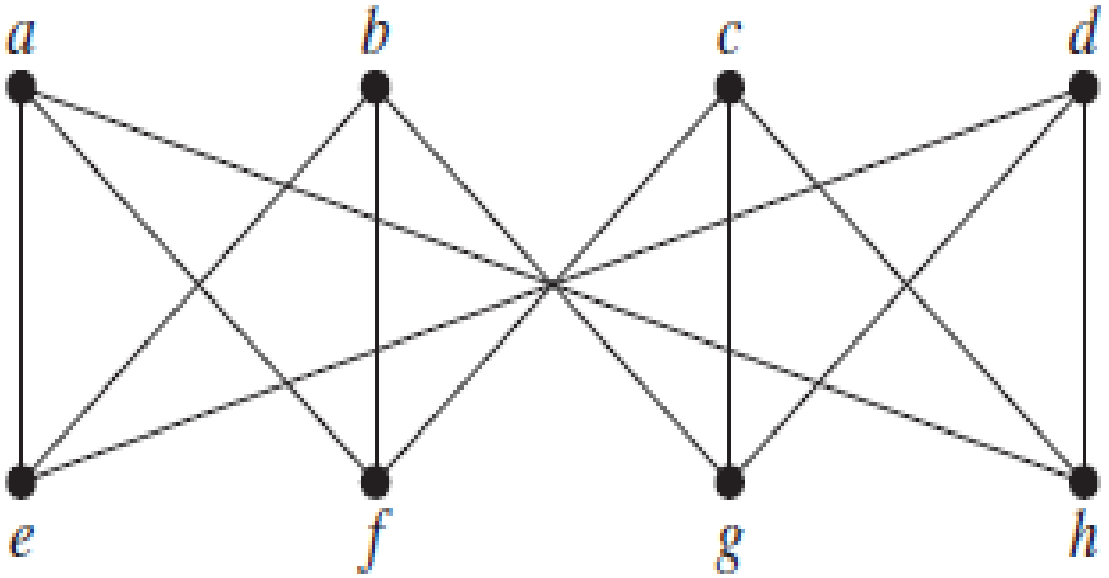
- Suppose that a connected bipartite planar simple graph has e edges and v vertices. Show that $e \leq 2v - 4$ if $v \geq 3$.

Exercise 4.

Prove Euler’s theorem n+r-e=2.

Exercise 5.

- use Kuratowski's theorem to determine whether the given graph is planar.



Exercise 6

- Prove that If G is a connected planar simple graph with e edges and v vertices, where $v \geq 3$, then

$$e \leq 3v - 6.$$