

HOMEWORK 13

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11. Find the shortest route (in distance) between computer centers in each of the following pairs of cities in the communications network shown in Figure 2.

- a). Boston and Los Angeles
- b) New York and San Francisco

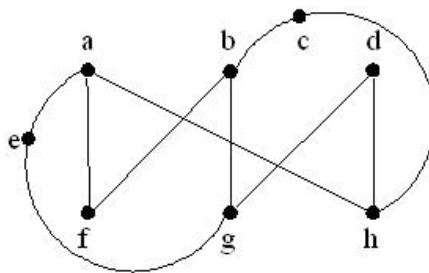
Solution:

- a) Boston, Chicago, Los Angeles.
- b) New York, Chicago, San Francisco.

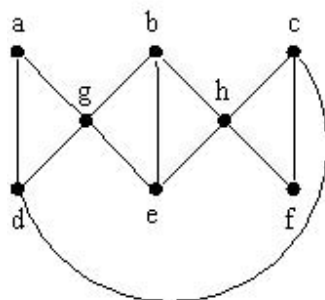
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In Exercises 20-22 determine whether the given graph is homeomorphic to $K_{3,3}$

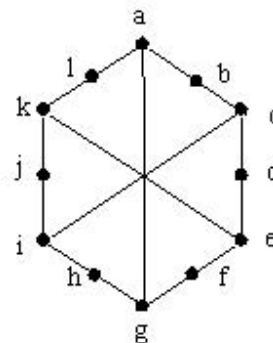
20.



21.



22.



Solution:

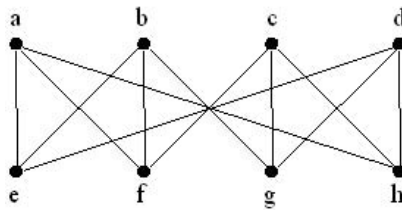
20. not homeomorphic to $K_{3,3}$.

21. not homeomorphic to $K_{3,3}$.

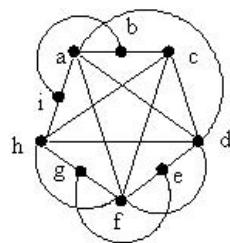
22. homeomorphic to $K_{3,3}$.

In Exercises 23-25 use Kuratowski's theorem to determine whether the given graph is planar.

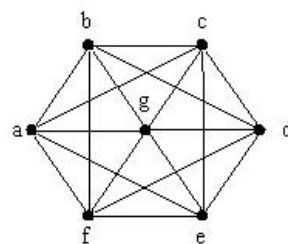
23.



24.



25.



Solution:

23. planar

24. Nonplanar, because it contains a subgraph homeomorphic to K_5 .

25. Nonplanar, because it contains a subgraph homeomorphic to $K_{3,3}$.