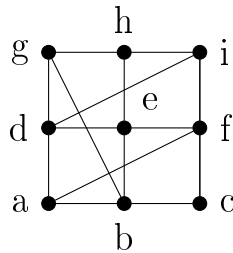
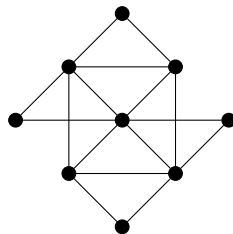


Repeated First Midterm Test, 5/8/2017

1. In an imaginary country the license plate numbers consist of 6 characters, each of which is either one of the 26 letters of the English alphabet or one of the digits $0, 1, \dots, 9$. The only condition on them is that the letter Y can appear at most once. How many license plate numbers can be given in the country?
2. A simple connected graph on 100 vertices has 100 edges. Show that the graph contains three pairwise different spanning trees. (Two spanning trees are different if their edge sets are not the same.)
3. Decide whether the following graph is planar or not.



4. In a simple graph on 20 vertices the degree of each vertex is 6. Prove that we can add one new edge to the graph in such a way that the resulting graph is still simple and contains an Euler trail.
5. Does the following graph contain a Hamilton cycle? And a Hamilton path?



6. In a simple graph on 20 vertices the degree of each vertex is at least 9. Prove that we can add one new edge to the graph in such a way that the resulting graph contains a Hamilton path.

Total work time: 90 min.

The full solution of each problem (including explanations) is worth 10 points. Show all your work! Results without proper justification or work shown deserve no credit.

Notes and calculators (and similar devices) cannot be used.

Grading: 0-23 points: 1, 24-32 points: 2, 33-41 points: 3, 42-50 points: 4, 51-60 points: 5.