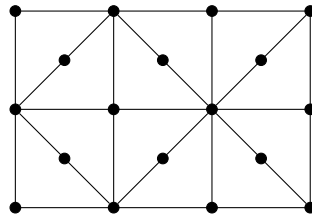


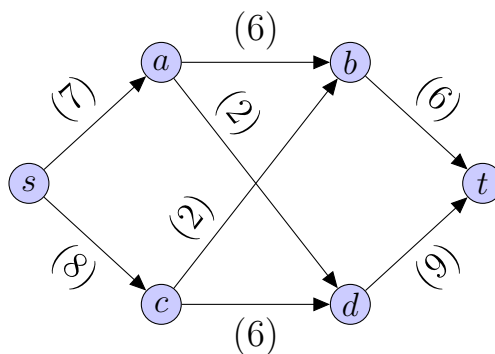
1. We want to make a new password for ourselves for safety reasons. We want the following conditions to be satisfied:
 - a) it should consist of letters only (from the 26 letters of the English alphabet),
 - b) no letter should appear more than once,
 - c) exactly 14 letters should appear, moreover 6 lowercase and 8 uppercase letters, but one letter in only one form.

How many passwords can we choose from with these conditions?

2. We add all the shortest diagonals to a regular 14-sided polygon. Determine the chromatic number of the graph (with 14 vertices and 28 edges) obtained.
3. Determine a maximum matching and a minimum covering set of vertices in the graph below.



4. Is there a complete bipartite graph on 101 vertices which contains an Euler trail? (In a complete bipartite graph all the vertices in one class are connected to all the vertices in the other class.)
5. Determine a maximum flow from s to t and a minimum s, t -cut in the network below.



6. * We select 30 squares on a 100×100 chessboard in such a way that they form a connected area (i.e. we can get from any of the selected squares to any other one by moving through selected squares with a common side only). Show that we can place eight 1×2 domino pieces without overlap on the selected squares in such a way that each domino covers exactly 2 (neighboring) squares.

Total work time: 90 min + 15 minutes for uploading. Late turn-ins are not accepted.

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.