Name: .....

Sample exam #2

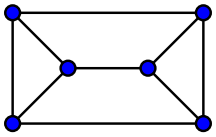
1. Degree sequences

a) When do we say that a sequence of numbers can be realized by simple graph?

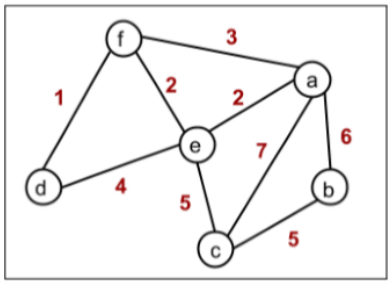
b) Using Havel–Hakimi-algorithm, decide if the following sequence can be realized by simple graph or not: $1, 1, 1, 2, 4, 5, 5, 5$.

2. Algorithms

a) What is a spanning tree? Find a spanning tree in the following graph:



b) Using Kruskal's algorithm, find a minimum cost spanning tree in the following edge-weighted graph:

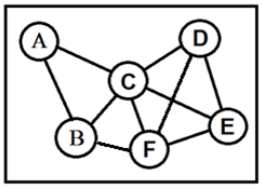


c) Using Dijsktra's algorithm, compute the distances of vertices from the source vertex a in the graph in b).

3. Vertex coloring

a) What do we mean on proper vertex coloring? How is the chromatic number of a graph defined?

b) Color the vertices of the graph below by the greedy coloring algorithm, in the following order: A, B, C, D, E, F.



c) What is a clique in a graph? How can the chromatic number $\chi(G)$ be bounded by the clique number $\omega(G)$? Explain your answer.