NAME:

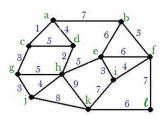
	Start	1	2	3	4	5	6	7	8
Grade:									

Graph Theory

Written examination / B

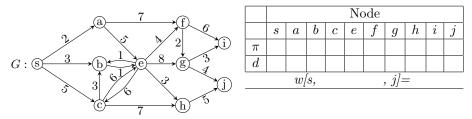
27 January 2021

1. (0.75p) Let G be the weighted graph. Mark the edges of G which form a minimum weight spanning tree of G, and indicate its weight.

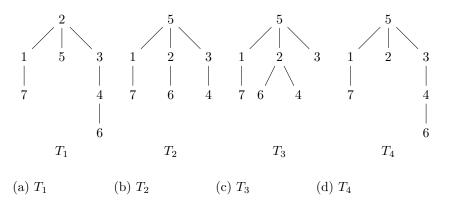


The total weight of the minimum spanning tree of G is:

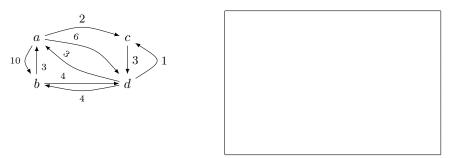
2. (1.25p) Consider the following graph. Apply the Dijkstra's algorithm in order to compute the lightest path from s to all the other nodes. Fill in the following table with the final results.



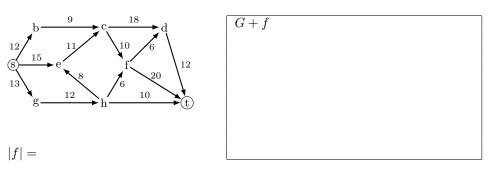
3. (1p) Which of the following trees has Prüfer sequence 5,4,3,5,1?



4. (1.5p) Let G be the weighted graph depicted below. Apply the Warshall algorithm to compute the matrix $WP^{[4]}$ of the lightest paths between any pair of nodes in G.



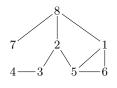
5. (1.5p) Find a maximum flow f in the flow network G with s and destination t depicted below. Draw G + f and indicate the value |f| of the maximum flow,

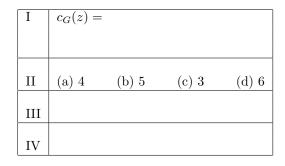


6. (0.5p) How many different trees with 6 nodes, there exist?

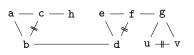
(a)
$$36$$
 (b) 8 (c) 216 (d) 120 (e) 1296

- 7. (2p) Consider the following graph. Compute:
 - (I) the chromatic polynomial $c_G(z)$ of G and
 - (II) what is the chromatic number of G?
 - (III) how many 2-colorings has G?
 - (IV) how many 3-colorings has G?





8. (0.5p) Let M be the matching made of the edges marked in the graph G depicted below:



(a) Indicate the set of M-saturated nodes of G

(b) Is M a maximal? Motivate your answer.

Start: 1p