

NAME:

Grade:

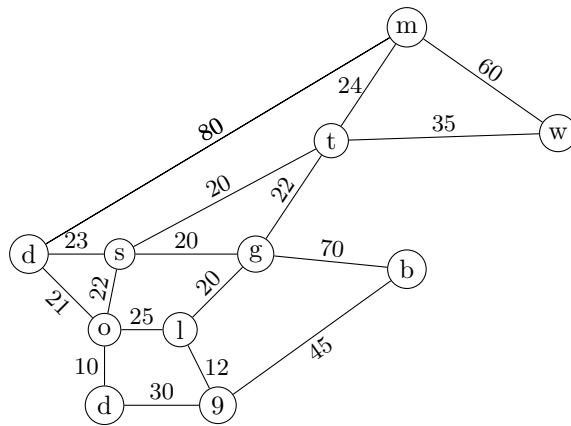
Start	1	2	3	4	5	6	7	8

# Graph Theory

Written examination / C

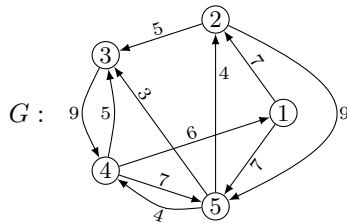
04 February 2021

1. (0.75p) Which is the minimum weight spanning tree of the following connected graph? (hint: apply the Kruskal algorithm)



- (a) 229
- (b) 216
- (c) 230
- (d) 234

2. (1.5p) Given the following weighted digraph. Apply the Warshall algorithm to compute the matrix  $WP^{[5]}$  of the lightest paths between any two nodes of  $G$ .

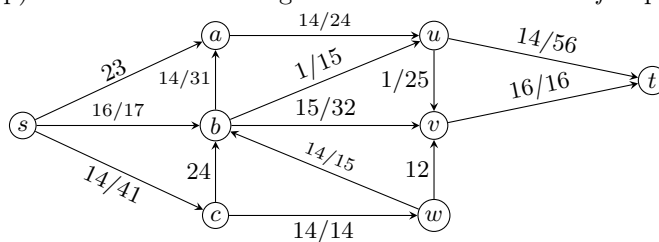


3. (0.50p) How many different trees with 5 nodes, labeled with numbers from 1 to 5, there exist?

- (a) 10
- (b) 5
- (c) 25
- (d) 125
- (e) 3125



8. (1.75p) Consider the following flow network  $G$  with flow  $f$  depicted below:



(a) Indicate the residual network  $G_f$ .

(b) Is  $f$  the maximum flow? If it is not, then indicate an augmenting path in  $G_f$ .

(c) Determine a maximum flow in the flow network with source  $s$  and sink  $t$ , and indicate its value.

Start: 1p