

Networks and Flows on Graphs

Final Exam

Duration of the exam : 1h30

No documents are allowed

Only *non-programmable* pocket calculators are allowed

Exercises can be done independently.

Exercise 1.

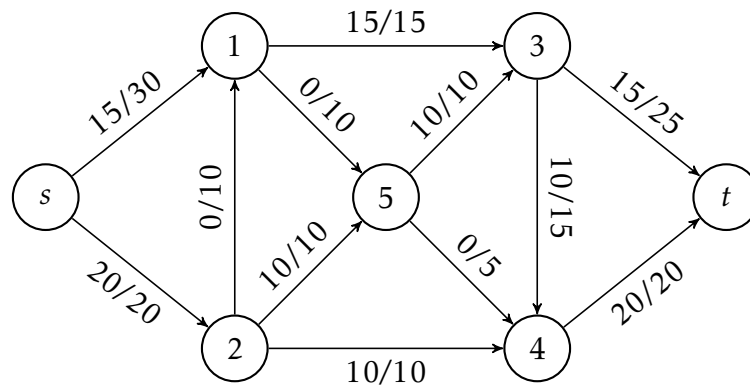
The following table sums up 16 tasks, named from a to p , each coming with the set of tasks *immediatly* preceding it and the time laps it takes to be done.

Name of task	Tasks preceding it	Time in weeks
a	-	2
b	a	8
c	b	1
d	c	3
e	d	5
f	c	1
g	f	2
h	c	2
i	h	3
j	i	8
k	e, g	7
l	k, j	2
m	l	1
n	k, j	1
o	b	8
p	m, n	1

1. Draw the MPM (Meta Potential Model) graph of this project planning problem.
2. Using relevant algorithms, give earliest dates of tasks a to p .
 - What is the minimum amount of time the project needs to be done?
 - What is the critical subgraph of the MPM graph?
3. Using relevant algorithms, give latest dates of tasks a to p .
 - What are the margins and free margins of non-critical tasks?

Exercise 2.

The following graph represents a network through which goes a flow. A label f/c corresponds to the flow value f along an arrow of capacity c .



Is the given flow of maximum value? If not, using relevant algorithms, show how to get a maximal flow and compute its value.