

Home work for  
**Fundamental Algorithms**  
 SS 2007  
 Sheet 10

**Exercise 24:** Consider the following input for the problem to schedule jobs on uniform machines:

$j$	1	2	3	4	5	6
$p_j$	1.0	3.0	2.4	1.9	3.4	2.9
$r_j$	2	4	3	1	3	5
$d_j$	4	8	7	4	7	10

We wish to determine the minimum number of machines  $M$  such that all jobs can be done in time. Show how to compute  $M$  in polynomial time by reducing the problem to a sequence of maximum flow problems. Apply your method to the instance above.

**Exercise 25:** Consider example 16 on slide 94. We have already seen that 2 rounds before the end of the season 1860 Muenchen is not a candidate for championship.

a) Three rounds before the end of the season the situation was as follows

Standings before the last 3 rounds:

Remaining games of the first 4 teams:

Team	Points
1 Werder Bremen	36
2 1.FC Köln	35
3 Borussia Dortmund	33
4 1860 Muenchen	31
...	

Hamburger SV	-	1. FC Koeln
Borussia Dortmund	-	1. FC Nuernberg
TSV 1860 Muenchen	-	Schalke 04
Meidericher SV	-	Werder Bremen
Werder Bremen	-	Borussia Dortmund
1.FC Köln	-	1. FC Nuernberg
1860 Muenchen	-	MSV Duisburg
1. FC Nuernberg	-	Werder Bremen
Borussia Dortmund	-	1. FC Köln
Hamburger SV	-	1860 Muenchen

Is 1860 Muenchen still a candidate to win the championships three rounds before end of season ? Justify your answer by an analysis of the corresponding flow network.

b) Today, the german soccer league plays according to the 3-point rule. The winner of a game scores 3 points, a tie scores 1 point to each team, and a loss scores 0 points. Under this rule, the situation would have been as shown to the right. Could 1860 Muenchen hope to win the championship if the league used this rule in 1964/1965 ?

Standings before the last 3 rounds:

Team	Points
1 1.FC Köln	49
2 Werder Bremen	49
3 Borussia Dortmund	47
4 1860 Muenchen	43
...	