C&O 370
HOMEWORK #4

Due: Monday, November 20

Reading

	Chapter 9	(pp. 366-385)	Integer Programming: Models & Modelling
	Chapter 9	(pp. 402-407)	Solution Methods: Cutting Planes
*	Chapter 9	(pp. 385-402)	Solution Methods: Branch & Bound/Enumeration
	Chvatal	(pp. 195-211)	Large-Scale L.P.'s: Column Generation Technique

* Optional reading - you may need it for your projects.

4.1 [30]

A printer has six jobs, $(J_1, J_2, \ldots, J_6)$, to be run on a single printing press. The run-sequence of jobs must obey the following precedence restrictions:

Thus, for example, J_5 may not start before both of J_2 and J_4 have been completed.

The following table gives the required run time (hrs.) and due date (cumulative hours from time 0) of each job:

	J_1	J_2	J_3	J_4	J_5	J_6
Run Time	2	3	4	3	2	1
Due Date	3	6	9	7	11	7

(a) Develop a model for determining a job run-sequence that satisfies the precedence restrictions and minimizes the maximum lateness of any job.

(b) Solve your model of part (a) by a method of your choice.

4.2 [20]

Use the column generation technique to solve (approximately) the cutting stock problem for which 15-ft. boards are to be cut to satisfy the following demands: 10 3-ft. boards, 20 5-ft. boards, 15 8-ft. boards and 8 2-ft. boards.

Problems

Case Study #3 [50]

A publisher wishes to contract a set of five manuscripts to a set of three print shops for typesetting. The table below gives the cost (upper triangle) and time required (lower triangle) for each printshop to do each manuscript. Printshops 1, 2 and 3 have, respectively, only 4, 7, and 5 weeks available to work for the publisher. No printshop may get a partial manuscript, and manuscripts 1 and 2 must go to the same printshop.

Each shop will discount its cost by 20% on each manuscript it gets in excess of (the most costly) one. There is a fixed cost of $100 charged by each shop for contract preparation but is levied only by shops which are given at least one manuscript.

MANUSCRIPTS

	1	2	3	4	5
1					
2					
3					

COST ($ X 100) / TIME (WKS) DATA

Determine how the publisher should distribute the five manuscripts amongst the three print shops in order to minimize the total cost of getting all of them typeset.