



Optimization Theory (1st Homework Assignment)

Exercise 1 (*Production Planning I*)

A manufacturer of central heating makes four models (A, B, C, and D) of radiators. The constraints on his production are the man hours needed and the sheet steel from which the radiators are pressed. The steel is in short supply, and is delivered weekly by a regular supplier. The following data is obtained for the forthcoming week

	per unit of model				available
	A	B	C	D	
man hours	0.5	1.5	2	1.5	500
steel (m^2)	4	2	6	8	2500
profit	5	5	12.5	10	

Formulate the manufacturer's production planning problem (maximization of profit) as a linear program.

4 Points

Exercise 2 (*Production Planning II*)

The ACME Electronics Company makes black-and-white (bw) and color television sets. Each bw set requires 3 hours of assembly, 1 hour of finishing, and 2 hours of testing. Each color set requires 5 hours of assembly, 3 hours of finishing, and 2 hours of testing. For this week's production run, ACME has required 3900 hours of assembly, 2100 hours of finishing, and 2200 hours of testing. If a bw set and a color set bring in \$ 100 and \$ 200 profit, respectively, then how many of each set should the company produce this week in order to maximize profit, and what is the maximum achievable profit?

Set up the problem as a linear program.

4 Points

Exercise 3 (*Optimal Land Usage*)

A farmer has a 1000 hectare farm on which he is considering growing barley and wheat. Land which is not sown with either crop will be left for grazing. He has sufficient cultivating and sowing machinery to sow up to 500 hectares of crop. It takes 4 hours to harvest 1 hectare of barley, but 8 hours to harvest 1 hectare of wheat. The farmer has several harvesters which are available for a total of 2800

hours in the appropriate period of the year. Barley, wheat and grazing require 30 kilos, 60 kilos, and 20 kilos of fertilizer per hectare, respectively, and yield an annual profit of \$ 60, \$ 100, and \$ 40 per hectare, respectively. The farmer has 32000 kilos of fertilizer available. Obviously, the farmer wants to maximize his profit.

Formulate the farmer's problem as a linear problem and specify the associated dual problem.

4 Points

Delivery of the homework at latest on August 30, 2006, 04:00 pm. The homework may be submitted either electronically (rohop@math.uh.edu) or as a hardcopy in class