Homework 3 (50 points) Due: Feb 20, 2019
COMPSCI 735: OPTIMIZATION: TECHNIQUES AND APPLICATIONS

Formulate the following problems as GAMS (LP) models and solve them. Submit this assignment electronically to Canvas. You should hand in exactly 4 files with the following names: hw3-1.gms, hw3-1.lst, hw3-2.gms, hw3-2.lst. The "lst" files are produced automatically when you execute "gams" model file.

Problem 1

The company Steelco has received an order for 500 tonnes of steel to be used in shipbuilding. The steel must have the following charactersitics:

Chemical Element	Minimum Grade (%)	Maximum Grade (%)
Carbon(C)	2	3
Copper(Cu)	0.4	0.6
Manganese(Mn)	1.2	1.65

The company has seven different raw materials in stock that may be used for the production of this steel. The following table lists the grades, available amounts and prices for all materials:

Raw Material	C%	Cu%	Mn%	Availability in t	Cost in $/t
Iron alloy1	2.5		1.3	400	200
iron alloy2	3		0.8	300	250
iron alloy3		0.3		600	150
cu1		90		500	220
cu2		96	4	200	240
al1		0.4	1.2	300	200
al2		0.6		250	165

Determine the composition of the steel that minimizes the production cost. (Answers: Min Cost: 98121.636)

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----     76 PARAMETER pct

c  2.000,    cu 0.600,    mn 1.200
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Problem 2

A forestry company has four sites on which they grow trees. They are considering four species of trees, the pines, spruces, walnuts and other hardwoods. Data on the problem are given below.

Site Number	Area (ka)	Expected annual yield (m^3/ka)				Expected annual revenue (money units per ka)			
		Pine	Spruce	Walnut	Hardwood	Pine	Spruce	Walnut	Hardwood
1	1500	17	14	10	9	16	12	20	18
2	1700	15	16	12	11	14	13	24	20
3	900	13	12	14	8	17	10	28	20
4	600	10	11	8	6	12	11	18	17
Minumum required yield thousand m^3		22.5	9	4.8	3.5				

How much area should the company devote to the growing of various species in the various sites to maximize the profit? (Max profit: 95031.189)