Homework 4 (50 points) Due: Feb 27, 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: hw4-1.gms, hw4-1.lst, hw4-2.gms, hw4-2.lst. The "lst" files are produced automatically when you execute "gams" model file.

Problem 1:

Solve the following the following problem, and write down (and solve) the dual of this LP problem in the same gams model file.

$$\min_{x_1,x_2,x_3} 3x_1 + 2x_2 - 33x_3$$

subject to

$$x_1 - 4x_2 + x_3 \leq 15$$

$$9x_1 + 6x_3 \leq 12$$

$$5x_1 + 9x_2 \geq 3$$

$$x_1, x_2, x_3 \geq 0$$

Problem 2

Glassco manufactures wine glasses, beer glasses, champagne glasses and whiskey glasses. Each type of glass uses time in the molding shop, time in the packaging shop, and a certain amount of glass. The resources required to make each type of glass are given in the following table.

	Wine Glass	Beer Glass	Chmpgne Glass	Whiskey Glass
Molding time	4 minutes	9 minutes	7 minutes	10 minutes
Packaging time	1 minute	1 minute	3 minutes	40 minutes
Glass	3 oz	4 oz	2 oz	1 oz
Selling price	$6	$10	$9	$20

At present, 600 minutes of molding time, 400 minutes of packaging time and 500 oz of glass are available.

2.1 Write down and solve the LP (in GAMS) that Glassco should solve, assuming the company wishes to maximize revenue. You should use appropriate sets to index both the variables you choose and the constraints that you formulate.

2.2 Write down (and solve) the dual of this LP problem, in the same GAMS le. You should set up two separate models and include just those equations needed in each model in the model statement.

Please also make note how the marginals of the constraints in Problem 2.1 are related to the level of the variables in Problem 2.2, and the marginals of the constraints in Problem 2.2 and the variables in Problem 2.1. (Max revenue: $933.33)