

## Econ172A: Note on HW3 problem 1

My explanation was somewhat misleading. Here is the correction.

Notation:

$c_{11}$	=	The amount of Chemical 1 used in Solvent 1
$c_{21}$	=	The amount of Chemical 2 used in Solvent 1
$c_{12}$	=	The amount of Chemical 1 used in Solvent 2
$c_{22}$	=	The amount of Chemical 2 used in Solvent 2
$S_1$	=	The amount of Solvent 1 produced
$S_2$	=	The amount of Solvent 2 produced

Since solvent 1 consists of  $c_{11}$  and  $c_{21}$ , we have

$$S_1 = c_{11} + c_{21}. \quad (1)$$

Similarly,

$$S_2 = c_{12} + c_{22}. \quad (2)$$

Blending constraints are:

$$c_{11} \geq 0.7S_1 \quad (3)$$

$$c_{12} \geq 0.4S_2 \quad (4)$$

If you substitute for  $S_1$  and  $S_2$ ,

$$0.3c_{11} - 0.7c_{21} \geq 0 \quad (5)$$

$$0.6c_{12} - 0.4c_{22} \geq 0 \quad (6)$$

You can use either a set of constraints (1)–(4), or a set of constraints (5)–(6), together with other constraints (labor hours, material, and the total amount of chemical 1 and chemical 2).

If you go with constraints (1)–(4), your LP has 8 variables and 8 functional constraints. If you use constraints (5)–(6), you have 6 variables and 6 functional constraints. These two sets are equivalent.