Correct Formulation for the Hexxon Oil Problem (Project #1 Part I)

Use the following models to answer the managerial questions in Part II of this Project.

(a) Define x_{ij} = the number of barrels of Constituent i blended to produce gasoline type j (i = 1, 2, 3, 4; j = R, U, S)

Maximize $1.5x_{1R} + 4.50x_{2R} + 7.50x_{3R} - 7.50x_{4R} + 3.00x_{1U} + 6.00x_{2U} + 9.00x_{3U} - 6.00x_{4U} + 7.50x_{1S} + 10.50x_{2S} + 13.50x_{3S} - 1.50x_{4S}$

Subject to

Supply Constraints

x_{1R}	+ x_{1U}	+ x_{1S}			≤	2500	(Constituent 1)
x_{2R}	+ x_{2U}	+ x_{2S}			≤	3000	(Constituent 2)
x_{3R}	+ x_{3U}	+ x_{3S}			≤	3500	(Constituent 3)
x_{4R}	+ x_{4U}	+ x_{4S}			≤	2000	(Constituent 4)

Demand Constraints

x_{1R}	+ x_{2R}	+ x_{3R}	+	x_{4R}	≥	2000	(Regular)
x_{1U}	+ x_{2U}	+ x_{3U}	+	x_{4U}	≥	4000	(Unleaded)
x_{1S}	+ x_{2S}	+ x_{3S}	+	x_{4S}	≥	3000	(Supreme)

Octane Constraints

$12x_{1R}$	+ $6x_{2R}$	+ $3x_{3R}$	+	$20x_{4R}$	≥	0	(Regular)
$6x_{1U}$	+ $0x_{2U}$	− $3x_{3U}$	+	$14x_{4U}$	≥	0	(Unleaded)
$2x_{1S}$	− $4x_{2S}$	− $7x_{3S}$	+	$10x_{4S}$	≥	0	(Supreme)

Logical Constraints

All variables ≥ 0

(b) The second formulation, based on the given memo, is the same as preceding one except that the objective function coefficient of x_{1S} is $9.00 - 0.001x_{1S}$ instead of 7.50.