A Maximization Problem in Standard Form

Maximize $c_1x_1 + c_2x_2 + \ldots + c_nx_n$

s.t. $x_i \geq 0$ for $i = 1, 2, \ldots, n$ and

$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1$
$a_{12}x_1 + a_{22}x_2 + \ldots + a_{1n}x_n = b_2$
$\vdots$
$a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mn}x_n = b_m$

$$c \text{ row} = [c_1 \ c_2 \ \ldots \ c_n]; \quad b \text{ column} = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_m \end{bmatrix}; \quad A \text{ matrix} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

Partial Initial Simplex Tableau

c row	
A matrix	b column

Initial Simplex Tableau

		x_1	x_2	$\ldots$	x_n		Ratio
Basis	c_B	c_1	c_2	$\ldots$	c_n		
x_{n-m+1}	0	a_{11}	a_{12}	$\ldots$	a_{1n}	b_1	
x_{n-m+2}	0	a_{12}	a_{22}	$\ldots$	a_{2n}	b_2	
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\ldots$	$\vdots$	$\vdots$	
x_n	0	a_{m1}	a_{m2}	$\ldots$	a_{mn}	b_m	
z_j		0	0	$\ldots$	0	0	
$c_j - z_j$		c_1	c_2	$\ldots$	c_n		

Initial Simplex Tableau Par, Inc. Example:

		x_1	x_2	s_1	s_2	s_3	s_4		Ratio
Basis	c_B	10	9	0	0	0	0		b_i/a_{i1}
s_1	0	7/10	1	1	0	0	0	630	900
s_2	0	1/2	5/6	0	1	0	0	600	1200
s_3	0	1	2/3	0	0	1	0	708	708
s_4	0	1/10	1/4	0	0	0	1	135	1350
z_j		0	0	0	0	0	0	0	
$c_j - z_j$		10	9	0	0	0	0		

First Iteration Par, Inc. Example:

Basis	c_B	x_1 10	x_2 9	s_1 0	s_2 0	s_3 0	s_4 0		Ratio b_i/a_{i2}
s_1	0	0	8/15	1	0	-7/10	0	134.4	252
s_2	0	0	1/2	0	1	-1/2	0	246	492
x_1	10	1	2/3	0	0	1	0	708	1062
s_4	0	0	11/60	0	0	-1/10	1	64.2	350.18
z_j		10	20/3	0	0	0	0	7080	
$c_j - z_j$		0	7/3	0	0	-10	0		

Second Iteration Par, Inc. Example:

Basis	c_B	x_1 10	x_2 9	s_1 0	s_2 0	s_3 0	s_4 0	
x_2	9	0	1	15/8	0	-21/16	0	252
s_2	0	0	0	-15/16	1	5/32	0	120
x_1	10	1	0	-5/4	0	15/8	0	540
s_4	0	0	0	-11/32	0	135/960	1	18
z_j		10	9	35/8	0	111/16	0	7668
$c_j - z_j$		0	0	-35/8	0	-111/16	0	