

(6-2) Simplex Method II

Identifying basic variables

	x_1	x_2	s_1	s_2	s_3	P	
BASIC							
s_2	3	0	-6	1	0	0	27
x_2	4	1	1	0	0	0	32
s_3	-2	0	7	0	1	0	14
P	-1	0	2	0	0	1	51

Pivot ~~elements~~ are 1's with 0s ~~above~~ above & below such that no two pivots share the same row. The (fixed) column labels for the pivots tell you the basic variables; label the corresponding rows with these variables.

$2R_2 \rightarrow R_2$ (continuing Friday's example)

x_1	x_2	s_1	s_2	s_3	P	
1	1/4	1/4	0	0	0	7
0	1	-1	2	0	0	4
0	3/4	-1/4	0	1	0	6
0	-11/4	5/4	0	0	1	35

$R_1 - \frac{1}{4}R_2 \rightarrow R_1, R_3 - \frac{3}{4}R_2 \rightarrow R_3, R_4 + \frac{11}{4}R_2 \rightarrow R_4$

x_1	x_2	s_1	s_2	s_3	P	
1	0	1/2	-1/2	0	0	6
0	1	-1	2	0	0	4
0	0	1/2	-3/2	1	0	3
0	0	5/4	11/2	0	1	46

~~-3/2~~ biggest negative in bottom row (except last entry)

$6 / (1/2) = 12$
 $3 / (1/2) = 6 \leftarrow \text{smallest}$

$2R_3 \rightarrow R_3$

$$\begin{array}{l}
 x_1 \\
 x_2 \\
 P
 \end{array}
 \left[\begin{array}{cccc|cc}
 1 & 0 & 1/2 & -1/2 & 0 & 0 & 6 \\
 0 & 1 & -1 & 2 & 0 & 0 & 4 \\
 0 & 0 & 1 & -3 & 1 & 0 & 6 \\
 \hline
 0 & 0 & \cancel{1} & 1/2 & 0 & 1 & 46
 \end{array} \right]$$

$x_1 \quad x_2 \quad s_1 \quad s_2 \quad s_3 \quad P =$

$$R_4 + \frac{3}{2}R_3 \rightarrow R_4$$

$$R_1 - \frac{1}{2}R_3 \rightarrow R_1, \quad R_2 + R_3 \rightarrow R_2,$$

$$\begin{array}{l}
 x_1 \\
 x_2 \\
 s_1 \\
 P
 \end{array}
 \left[\begin{array}{cccc|cc}
 1 & 0 & 0 & 1 & -1/2 & 0 & 3 \\
 0 & 1 & 0 & -1 & 1 & 0 & 10 \\
 0 & 0 & 1 & -3 & 1 & 0 & 6 \\
 \hline
 0 & 0 & 0 & 1 & \cancel{1} & 1 & \cancel{55}
 \end{array} \right]$$

↑ no negatives

We found the maximum

$$\begin{array}{l}
 x_1 = 3 \\
 x_2 = 10 \\
 s_1 = 6 \\
 P = 55
 \end{array}$$

$$s_2 = s_3 = 0$$

The maximum P is ~~60~~ 55

at $x_1 = 3, x_2 = 10$

(with slack $s_1 = 6$).

