The entry on the pivot column and row is called the pivot entry.

Step 4: Use basic row operations to obtain 1 in the pivot position and zeros in the other positions of the pivot column.

	x_1	x_2	s_1	s_2	P	
s_1	8	8	1	0	0	160
s_2	4	**12**	0	1	0	180
P	−5	−10	0	0	1	0

$R_2 \to \frac{1}{12} R_2$

8	8	1	0	0	160
$\frac{1}{3}$	1	0	$\frac{1}{12}$	0	15
−5	−10	0	0	1	0

$R_1 \to -8R_2 + R_1$

$R_3 \to 10R_2 + R_3$

After the row operations:

$$\left(\begin{array}{cccccc|c} 5.333\ldots & 0 & 1 & -0.666\ldots & 0 & & 40 \\ 0.333\ldots & 1 & 0 & 0.0833\ldots & 0 & & 15 \\ -1.666\ldots & 0 & 0 & 0.833\ldots & 1 & & 150 \end{array}\right)$$

$$\begin{array}{c} \\ s_1 \\ x_2 \end{array}\left(\begin{array}{cccccc|c} x_1 & x_2 & s_1 & s_2 & P & & \\ \frac{16}{3} & 0 & 1 & -\frac{2}{3} & 0 & & 40 \\ \frac{1}{3} & 1 & 0 & \frac{1}{12} & 0 & & 15 \\ -\frac{5}{3} & 0 & 0 & \frac{5}{6} & 1 & & 150 \end{array}\right)$$

Step 5: If there are still negative numbers on the bottom row, repeat the process until there are no more negative #'s on the bottom row

exiting → pivot position → Pivot row

entering

	x_1	x_2	s_1	s_2	P	
s_1	$\frac{16}{3}$	0	1	$-\frac{2}{3}$	0	40
x_2	$\frac{1}{3}$	1	0	$\frac{1}{12}$	0	15
P	$-\frac{5}{3}$	0	0	$\frac{5}{6}$	1	150

$\frac{40}{\frac{16}{3}} = 7.5$ $\quad \frac{15}{\frac{1}{3}} = 45$

$\frac{3}{16} \cdot \left(-\frac{2}{3}\right)$ $\quad \frac{3}{16} \cdot 40$

Pivot column

$R_1 \to \frac{3}{16} R_1$

	x_1	x_2	s_1	s_2	P	
	1	0	$\frac{3}{16}$	$-\frac{1}{8}$	0	7.5
	$\frac{1}{3}$	1	0	$\frac{1}{12}$	0	15
	$-\frac{5}{3}$	0	0	$\frac{5}{6}$	1	150

$R_2 \to -\frac{1}{3} R_1 + R_2$

$R_3 \to \frac{5}{3} R_1 + R_3$

	x_1	x_2	s_1	s_2	P	
x_1	1	0	0.1875	-0.125	0	7.5
x_2	0	1	-0.0625	0.125	0	12.5
P	0	0	0.3125	0.625	1	162.5

$R_3 \to \frac{5}{3} R_1 + R_3$ | 0 | 0 | 0.3125 | 0.625 | 1 | 162.5

Step 6: Once we get no more negative in the bottom row, the right most column gives us the optimal solution.

$x_1 = 7.5$; $x_2 = 12.5$, $P = 162.5$.

HW # 8

Maximize $P = 7x_1 + 8x_2 + 10x_3$

Constraints: $2x_1 + 3x_2 + 2x_3 \leq 950$

$x_1 + x_2 + 2x_3 \leq 750$

$x_1, x_2, x_3 \geq 0$

$$2x_1 + 3x_2 + 2x_3 + s_1 = 950$$
$$x_1 + x_2 + 2x_3 + s_2 = 750$$
$$-7x_1 - 8x_2 - 10x_3 + P = 0$$

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pivot column

Simplex Tableau

	x_1	x_2	x_3	s_1	s_2	P	
s_1	2	3	2	1	0	0	950
s_2	1	1	2	0	1	0	750
P	-7	-8	-10	0	0	1	0

Pivot Row

pivot row

$R_2 \leftrightarrow \frac{1}{2}R_2$

$R_1 \leftrightarrow -2R_2 + R_1$

$R_3 \leftrightarrow 10R_2 + R_3$

x_3	1	2	0	1	-1	0	200
	$\frac{1}{2}$	$\frac{1}{2}$	1	0	$\frac{1}{2}$	0	375
	-2	-3	0	0	5	1	3750

pivot column