Maximize $P = 3x + 5y + 2z$

Subject to:

$2x + y + z \leq 14$

$4x + 2y + 3z \leq 28$

$x + 3y + 2z \leq 18$

with $x, y, z \geq 0$

1) Convert Inequalities to Eqns

Slack variables $s_1, s_2, s_3 \geq 0$

$2x + y + z + s_1 = 14$

$4x + 2y + 3z + s_2 = 28$

$x + 3y + 2z + s_3 = 18$

Obj Function: $z - 3x - 5y - 2z = 0$

Basis	x	y	z	s_1	s_2	s_3	RHS
z	-3	-5	-2	0	0	0	0
s_1	2	1	1	1	0	0	14
s_2	4	2	3	0	1	0	28
s_3	1	3	2	0	0	1	18

$s_3 = s_3/3$

Basis	x	y	z	s_1	s_2	s_3	RHS
z	-3	-5	-2	0	0	0	0
s_1	2	1	1	1	0	0	14
s_2	4	2	3	0	1	0	28
s_3	1/3	1	2/3	0	0	1/3	6

$z = z + 5s_3$

$s_1 = s_1 - s_3$

$s_2 = s_2 - 2s_3$

Basis	x	y	z	s_1	s_2	s_3	RHS
z	-4/3	0	4/3	0	0	5/3	30
s_1	5/3	0	1/3	1	0	-1/3	8
s_2	10/3	0	5/3	0	1	-2/3	16
s_3	1/3	1	2/3	0	0	1/3	6

$s_1 = \frac{3}{5} s_1$

Basis	x	y	z	s_1	s_2	s_3	RHS
z	-4/3	0	4/3	0	0	5/3	30
s_1	1	0	1/5	3/5	0	-1/5	4.8
s_2	10/3	0	5/3	0	1	-2/3	16
s_3	1/3	1	2/3	0	0	1/3	6

$z = z + \frac{4}{3} s_1$

$s_2 = s_2 - \frac{10}{3} s_1$

$s_3 = s_3 - \frac{1}{3} s_1$

Basis	x	y	z	s_1	s_2	s_3	RHS
z	0	0	8/5	4/5	0	7/5	36.4
s_1	1	0	1/5	3/5	0	-1/5	4.8
s_2	0	0	1	-2	1	0	0
s_3	0	1	3/5	-1/5	0	2/5	4.4

All coefficients in z are non-negative so

$\Rightarrow$ the current solution is optimal.

Solution:

$x = 4.8$, $y = 4.4$, $z = 0$, $P = 36.4$