#1 Minimize $C = 30x + 40y + 50z$

$\Leftrightarrow$

Maximize $P = -C = -30x - 40y - 50z$

$$10x + 14y + 5z - s = 220$$
$$5x + 3y + 9z - t = 340$$
$$30x + 40y + 50z + P = 0$$

		x	y (column)	z	s	t	P	constants	
*	s	10	(14)	5	-1	0	0	220	220/14
*	t	5	3	9	0	-1	0	340	340/3
	P	30	40	50	0	0	1	0	

#2
$$7x + 2y + 12z + s = 312$$
$$13x + 20y + 12z - t = 384$$
$$5x + 4y + 12z - u = 192$$
$$-14x - 24y - 26z + P = 0$$

		x	y (column)	z	s	t	u	P	constants	
	s	7	2	12	1	0	0	0	312	312/2
*	t	13	(20)	12	0	-1	0	0	384	384/20
*	u	5	4	12	0	0	-1	0	192	192/4
	P	-14	-24	-26	0	0	0	1	0	

3. The following is an initial tableau.

		x	y	z	s	t	u	p	constants
	s	6	1	5	1	0	0	0	68
*	t	4	3	1	0	−1	0	0	32
*	u	2	4	3	0	0	−1	0	36
	p	−8	−2	−6	0	0	0	1	0

3a. Is this tableau in phase I or phase II? Phase I

3b. Determine the pivot.

4. The following is an initial tableau.

	x	y	z	s	t	u	p	constants
s	5	4	3	1	0	0	0	8
t	2	7	1	0	1	0	0	15
u	6	8	5	0	0	1	0	24
p	−8	−10	−4	0	0	0	1	0

4a. Is this tableau in phase I or phase II? Phase II

4b. Determine the pivot.

5. The following tableau is neither an initial tableau nor a final tableau.

	x	y	s	t	u	v	p	constants
s	0	−1	1	0	0	−1	0	10
t	0	2	0	1	0	−1	0	35
* u	0	1	0	0	−1	−2	0	10
x	1	0	0	0	0	1	0	25
p	0	−1	0	0	0	2	1	50

5a. Is this tableau in phase I or phase II?

5b. Determine the pivot.

5c. Determine the values of x, y, s, t, u, v, and p at this stage.

6. Evaluate $3\begin{bmatrix} 1 & -2 \\ 2 & 3 \end{bmatrix} + 4\begin{bmatrix} 0 & 2 \\ -3 & -1 \end{bmatrix}$.

7. Compute the product $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}\begin{bmatrix} 2 & -6 & 3 \\ 4 & 2 & 9 \\ 8 & -7 & 2 \end{bmatrix}$.

8. Compute the product $\begin{bmatrix} 2 & -3 & 1 \\ 4 & 0 & -6 \end{bmatrix}\begin{bmatrix} -1 & 3 & 2 & 4 \\ 4 & 0 & 5 & 1 \\ 1 & -2 & -7 & 0 \end{bmatrix}$.

9. Translate the given system of linear equations into matrix form.

$$\begin{aligned} x \quad +2y \quad -z &= 5 \\ -x \qquad +3z &= 6. \\ 2x \quad -y \qquad &= 7 \end{aligned}$$

#6 $3\begin{bmatrix} 1 & -2 \\ 2 & 3 \end{bmatrix} + 4\begin{bmatrix} 0 & 2 \\ -3 & -1 \end{bmatrix}$

$= \begin{bmatrix} 3 & -6 \\ 6 & 9 \end{bmatrix} + \begin{bmatrix} 0 & 8 \\ -12 & -4 \end{bmatrix}$

$= \begin{bmatrix} 3 & 2 \\ -6 & 5 \end{bmatrix}$

#7 $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}\begin{bmatrix} 2 & -6 & 3 \\ 4 & 2 & 9 \\ 8 & -7 & 2 \end{bmatrix}$

3×3 3×3

$= \begin{bmatrix} 6 & -4 & 12 \\ 10 & -13 & 5 \\ 12 & -5 & 11 \end{bmatrix}$

#8 $\begin{bmatrix} 2 & -3 & 1 \\ 4 & 0 & -6 \end{bmatrix}\begin{bmatrix} -1 & 3 & 2 & 4 \\ 4 & 0 & 5 & 1 \\ 1 & -2 & -7 & 0 \end{bmatrix}$

2×3 3×4

$= \begin{bmatrix} -13 & 4 & -18 & 5 \\ -10 & 24 & 50 & 16 \end{bmatrix}$

#9

$$\begin{bmatrix} 1 & 2 & -1 \\ -1 & 0 & 3 \\ 2 & -1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \\ 7 \end{bmatrix}$$

#10

$$\begin{array}{c} \\ R_2-R_1 \\ R_3+R_1 \end{array} \left[\begin{array}{ccc|ccc} 1 & 1 & -2 & 1 & 0 & 0 \\ 1 & 2 & -1 & 0 & 1 & 0 \\ -1 & 1 & 3 & 0 & 0 & 1 \end{array}\right]$$

$$= \begin{array}{c} R_1-R_2 \\ \\ R_3-2R_2 \end{array} \left[\begin{array}{ccc|ccc} 1 & 1 & -2 & 1 & 0 & 0 \\ 0 & 1 & 1 & -1 & 1 & 0 \\ 0 & 2 & 1 & 1 & 0 & 1 \end{array}\right]$$

$$= \begin{array}{c} R_1-3R_3 \\ R_2+R_3 \\ \end{array} \left[\begin{array}{ccc|ccc} 1 & 0 & -3 & 2 & -1 & 0 \\ 0 & 1 & 1 & -1 & 1 & 0 \\ 0 & 0 & -1 & 3 & -2 & 1 \end{array}\right]$$

$$= \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -7 & 5 & -3 \\ 0 & 1 & 0 & 2 & -1 & 1 \\ 0 & 0 & -1 & 3 & -2 & 1 \end{array}\right]$$

$$= \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -7 & 5 & -3 \\ 0 & 1 & 0 & 2 & -1 & 1 \\ 0 & 0 & 1 & -3 & 2 & -1 \end{array}\right]$$

$I \qquad\qquad A^{-1}$

#11

$$\begin{bmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 1 & -3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 2 & 1 \\ -5 & 8 & 2 \\ 7 & -11 & -3 \end{bmatrix} \begin{bmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 1 & -3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 & 2 & 1 \\ -5 & 8 & 2 \\ 7 & -11 & -3 \end{bmatrix} \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ -12 \\ 16 \end{bmatrix}$$