

MAT 114 – 001
Test Two
Show all work.

1a. Write the initial tableau for the following minimum problem. You need not solve the problem.

$$\text{Minimize } c = 12x + 6y + 3z$$

subject to the following structural constraints and nonnegativity.

$$\begin{aligned} 8x + 2y + 3z &\geq 144 \\ 6x + y + 3z &\leq 120 \end{aligned}$$

1b. Determine the first pivot. You do not need to do the pivot – just determine the row and column of the first pivot.

2a. Write the initial tableau for the following maximum problem. You need not solve the problem.

$$\text{Maximize } p = 6x + 6y + 3z$$

subject to the following structural constraints and nonnegativity.

$$\begin{aligned} x + 3y + 3z &\leq 120 \\ 5x + 10y + 5z &\geq 300 \\ 4x + 2y + 1z &\leq 90 \end{aligned}$$

2b. Determine the first pivot. You do not need to do the pivot – just determine the row and the column of the first pivot.

3. 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	0	0	1 2
x	1	1	0	-1	0	0	0	16
u	0	3	0	-5	-1	0	0	12
v	0	3	0	-5	0	1	0	1 2
p	0	-1	0	-5	0	0	1	80

3a. Determine the values of $x, y, s, t, u, v,$ and p at this stage.

3b. Is this tableau in phase I or phase II?

3c. Determine the pivot.

4. Evaluate $2\begin{bmatrix} 1 & -2 & 4 \\ 3 & 1 & 0 \end{bmatrix} + 3\begin{bmatrix} -2 & 0 \\ 2 & 1 \\ 4 & 0 \end{bmatrix}^T - 4\begin{bmatrix} 7 & -3 & 9 \\ -2 & 4 & 6 \end{bmatrix}$.

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

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

$$\begin{array}{rclcl} x & +2y & -z & = & 2 \\ x & +y & +2z & = & 0 \\ x & -y & -z & = & -1 \end{array} .$$

7. Find the inverse of $\begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$.

8. $\begin{bmatrix} 3 & -1 & -1 \\ -4 & 2 & 1 \\ -1 & 0 & 1 \end{bmatrix}$ is the inverse of the coefficient matrix of the following system of linear equations.

$$\begin{aligned} 2x + y + z &= 1 \\ 3x + 2y + z &= 2 \\ 2x + y + 2z &= -1 \end{aligned}$$

Translate the system of linear equations into matrix form and solve the system using the inverse of the coefficient matrix.