

MAT 114 – 006  
Spring 2009  
Test Two  
Show all work.

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

$$\text{Minimize } c = 24x + 18y + 24z$$

subject to the following structural constraints and nonnegativity.

$$\begin{array}{rclcl} 3x & +2y & +z & \geq & 4 \\ x & +y & +3z & \leq & 6 \end{array}$$

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.

$$\text{Maximize } p = 2x + y + z$$

subject to the following structural constraints and nonnegativity.

$$\begin{array}{rclcl} x & +2y & +3z & \leq & 28 \\ 2x & +3y & -1z & \leq & 6 \\ x & -2y & +z & \geq & 4 \end{array}$$

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.

	$x$	$y$	$z$	$s$	$t$	$u$	$p$	constants
$z$	0	-2	5	-3	0	-2	0	3
$t$	0	3	0	-3	-15	-12	0	3
$x$	15	3	0	-3	0	3	0	18
$p$	0	666	0	249	0	-84	15	-999

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

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

3c. Determine the pivot.

4. Evaluate  $4 \begin{bmatrix} 1 & 3 & -2 \\ 5 & 9 & 7 \\ -4 & 0 & 6 \end{bmatrix} - 6 \begin{bmatrix} 8 & -3 & 2 \\ 2 & 5 & 9 \\ 0 & 4 & 1 \end{bmatrix}$ .

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

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

$$\begin{array}{rcl} 3x & -5y & +4z = 10 \\ 4x & +2y & -3z = -1 \\ -x & & +z = -2 \end{array}$$

7. Find the inverse of  $\begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}$ .

8.  $\begin{bmatrix} 1 & -1 & 0 \\ -2 & 5 & 1 \\ -1 & 3 & 1 \end{bmatrix}$  is the inverse of the coefficient matrix of the following system of linear equations.

$$\begin{aligned} 2x + y - z &= 5 \\ x + y - z &= 4 \\ -1x - 2y + 3z &= -8 \end{aligned}$$

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