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.

Minimize $c = 24x + 18y + 24z$

subject to the following structural constraints and nonnegativity.

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

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.

Maximize $p = 2x + y + z$

subject to the following structural constraints and nonnegativity.

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

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.

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

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.