Exam 11 Name: ______________________________ RHS

Linear Algebra

Show your work for full credits.

1. Evaluate
$\begin{bmatrix} 2 & -1 \\ 5 & 4 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$

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

3. Express the system of equations in column form and matrix form.
$$2x - y = 4$$
$$3x + 2y = -2$$

4. Is the given a singular case? Justify
$$3x - y = 7$$
$$-6x + 2y = 5$$

5. Find the values of x, y, and z for the given equations by elimination method.
$$x + y - z = -4$$
$$3x - y + z = 8$$
$$-2x + 3y - 2z = -14$$

6. the inverse of the given matrix. Then, show that product of the given matrix and the inverse is the identity.
$$\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$$

7. If the given matrix is singular, find a value for a.
$$\begin{bmatrix} 2 & a \\ a & 8 \end{bmatrix}$$

Exam 12 Name:________________________________ RHS
Linear Algebra

Show your work for full credits.

Part I – (95 pts)

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

1. Find the inverse of the given matrix, A.
2. Factor A into LU.
3. Find the transpose of A.

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4. Factor B into LU, where $a, b, c > 0$.(5 pts)

$$B = \begin{bmatrix} a & a & a \\ a & b & b \\ a & b & c \end{bmatrix}$$

5. A is 2 x 2 matrix with $A^6 = I$. Find A.

Exam 13 **Name:** ____________________________ **RHS**

Linear Algebra

Show your work for full credits.
Total: 105 points

Part I – 95 pts

1) Addition and scalar multiplication are required to satisfy these eight rules:

1. $x + y = y + x$.
2. $x + (y + z) = (x + y) + z$.
3. There is a unique "zero vector" such that $x + 0 = x$ for all x.
4. For each x there is a unique vector $-x$ such that $x + (-x) = 0$.
5. $1x = x$.
6. $(c_1 c_2)x = c_1(c_2 x)$.
7. $c(x + y) = cx + cy$.
8. $(c_1 + c_2)x = c_1 x + c_2 x$.

Suppose $(x_1, x_2) + (y_1, y_2)$ is defined to be $(x_1 + y_1, x_2 + y_1)$. With the usual multiplication $c\boldsymbol{x} = (cx_1, cx_2)$, which of the eight conditions are not satisfied? (Write at least one rule and explain.)

2) Describe the column space and the null space for the given matrix.

$$\begin{bmatrix} 1 & 0 & 2 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 3 \end{bmatrix}$$

3) In $\mathbf{R}^2$, explain why a set of $\left\{\begin{bmatrix} 0 \\ 0 \end{bmatrix}\right\}$ can be a subspace but not a set of $\left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}\right\}$.

Part II – 10 pts

4) Construct a matrix whose null space consists of all linear combinations of $\begin{bmatrix} 2 \\ 1 \\ 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 3 \\ 5 \\ 0 \\ 1 \end{bmatrix}$. (pivot columns 1 and 2, free variables x_3 and x_4)

Quarter 1 Exam
Linear Algebra

Show your work for full credits.

Part I – 95 points

1. Find the column space and the null space for

$$A = \begin{bmatrix} 1 & 3 & 2 & 4 \\ 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 2 \end{bmatrix}$$

2. Find the values of x, y, and z for the given equations.

$$x + y + z = 3$$
$$2x + 3y + 4z = 11$$
$$4x + 3y + z = 5$$

3. Find LU factorization for B.

$$B = \begin{bmatrix} 1 & 3 & 2 \\ 0 & 1 & 2 \\ 2 & 1 & 4 \end{bmatrix}$$

Part II – 10 points

4. Find a 2 x 2 matrix, where inverse of the matrix is the same as the transpose of the matrix. (The matrix cannot contain 0 or 1 as an element.)