Math. 362-03
Spring, 2019
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Third Exam
Tuesday, April 30, 2019

This exam is closed book. Make sure your name is on all pages. Show all work, and show it in a logical and organized manner: You will be graded on what you show, in addition to your answer. Check your work carefully. *Each part of each problem is worth 25 points.*

1. Determine a basis for the row space, column space, and null space of the following matrices.

$$\text{(i)} \quad A = \begin{bmatrix} 0 & 1 & 0 & -1 & 2 \\ 0 & 0 & 1 & 1 & -3 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}. \quad \text{(ii)} \quad B = \begin{bmatrix} 0 & 1 & 2 & 1 & -4 \\ 0 & -1 & 1 & 2 & -5 \\ 0 & 1 & 1 & 0 & -1 \end{bmatrix}.$$

2. Write down the rank, nullity, dimension of the row space, and dimension of the column space of the following matrix. Explain why these values are what you say they are.

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \end{bmatrix}.$$

3. Compute the eigenvalues and bases for the corresponding eigenspaces of the following matrix.

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