Name:_____ İTÜ ID:_____ Signature:_____.

MAT281E – Extra Final Exam 2– Part 1, Summer 2020, Duration: 30 Minutes

Instructions:

- *Do NOT communicate with other people, including your friends, classmates, and family members!*
- *This is an open-book exam. Give your answers in English.*
- *Write the question number, your Name and İTÜ ID on the top of each page and **sign all pages**.*
- *Scan or take photo of your answers and upload them on Ninova within a **zip** file **before the deadline**!*
- *You will have 15 minutes to upload your answers on Ninova. **Accepted file formats** are *.pdf, *.jpeg, or *.png!*

Q1) (20 pts) Given the following A^{-1}, B matrices and b vector, solve the $ABx - b = 0$ for x

$A^{-1} = \begin{bmatrix} 1 & 5 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$

Q2) (**30 pts**) Let $A = \begin{bmatrix} 2 & -1 & 3 & 1 & 8 \\ 1 & 3 & -9 & 4 & -2 \\ 0 & 1 & -3 & 1 & 3 \\ -2 & 3 & -9 & 1 & 7 \\ 3 & -1 & 3 & 2 & -1 \end{bmatrix}$ matrix.

i. Find a basis for the null space of A.

ii. Find a basis for the column space of A.

iii. Determine the rank(A)?

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$$A = \begin{bmatrix} 2 & 0 & 0 \\ 3 & 8 & 0 \\ -1 & 5 & 1 \end{bmatrix}$$

Q3) (20 pts) Use matrix A given above to find the characteristic equation of A.

Q4) (30 pts) Use matrix A given above to solve the following problems.

i. **(10 pts) Find eigenvalues of A.**

ii. **(10 pts) Find eigenspace of A corresponding the smallest eigenvalue.**

iii. **(10 pts) Find the basis for the eigenspace of A corresponding the smallest eigenvalue.**