**FINAL EXAM** (MATH 3320 REMONTE CHEN SPRING 2021)

11:30 AM – 2:00 PM Monday, April 26, 2021

Note: This is an open-book exam. You can use any materials in hands, computer or online for the exam, but inter-person communications during the exam by any mean (phone, internet, *etc*.) are not permissible. The exam has 6 problems worth 100 points plus one bonus problem (Problem 7) worth 10 points. *Show your work for credit.* Submit your work in Canvas by 3:00 pm.

Your Name: \_\_\_\_\_Sidney Sanders\_\_\_\_

1. (20=10+10 points) Let an. Denote , ,  for the three columns of *A*.
2. Determine if  is linearly independent.
3. A piece of paper with writing on it

   Description automatically generated with medium confidenceIs b in *Span*and why?
4. (20=10+10 points) Let .
5. Determine if *A* is invertible and if it is, find the inverse of *A*. Use as few calculations as possible. Justify your answer.
6. Text, letter

   Description automatically generatedFind the dimensions of Col *A* and Nul *A*.
7. (10 points) Solve the equation  by using the LU factorization given below for A.

= .

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1. (20 =10+10 points) Consider the subspace of the vector space of all polynomial functions in the ordinary addition and scalar multiplication operations of functions, where

,

,

,

,

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1. Find a basis of *H*.
2. Let . Determine if *p* is in *H*. If it is, find the coordinate vector of *p* relative to the basis you find in (a).

Text, letter

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1. (10 points) Let . Find the characteristic polynomial of *A*.

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1. (20=10+10 points) Let .
2. Show that 3 is an eigenvalue of *A*.
3. Find a basis for the eigenspace corresponding to the eigenvalue λ=3.

Text, letter

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1. (Bonus 10 points) Let  and be two subspaces of vector space V. Assume (i) both and are linearly independent sets, and (ii)  i.e., and shares only one vector that is the zero vector. Show that

A picture containing diagram

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