

MATH 3191 Exam 1 Review

1 Format of Exam

The exam will take the following format

1. Some short response questions that require a sentence or two explaining why a statement is true or false (A beginning of what a proof might look like) ~ 30 mins
2. Longer response questions that will require you to compute a numerical answer and show work on how it was achieved ~ 30 mins
3. Final question on lecture based content ~ 15 mins

2 Written Homework Problems

You should be able to do all of the Written Homework problems up to and including HW5. If you want help with your solutions or how to approach these problems, just let me know!

3 MyOpenMath Problems

I would pay attention to the following topics associated with each problem below

1. HW1: 5, 7, 10, 20, 21, 22
 - (a) Be able to do row operations and identify how to get from one to another
 - (b) Solve a 2 by 2, 3 by 3, and 4 by 4 linear system.
 - (c) Identify the number of solutions to a linear system
 - (d) Add vectors
 - (e) Write a vector as a linear combination of others
 - (f) Know what a span is and how to compute it
2. HW2: 1, 2, 8, 10, 14,
 - (a) Be able to multiply matrices and vectors
 - (b) Be able to convert between systems of equations and matrix equations

- (c) Give a solution set to a system of equations
 - (d) Give solutions to a homogeneous linear system.
3. HW3: 2, 3, 4, 7, 9, 15, 17, 18, 19
- (a) Determine conditions for a given matrix to have linearly dependent or independent columns
 - (b) Know properties of a linear transformation and determine if a function is linear.
 - (c) Be able to construct a matrix associated with a linear transformation given the image of some vectors
4. HW4: 1, 2, 4, 8, 16, 17, 19, 22, 23
- (a) Identify what a given transformation is (translation, rotation, scaling, etc)
 - (b) Be able to construct the matrix associated with a given transformation (translation, rotation, scaling, etc)
 - (c) Determine if a given transformation is injective/surjective
 - (d) Determine when matrix-multiplication is defined and compute the matrix product
 - (e) Compute the transpose of a matrix
 - (f) Determine how many solutions invertible and non-invertible matrices can have.
5. HW5: 1, 10, 17, 20, 21, 22
- (a) Determine if a matrix is invertible using the invertible matrix theorem
 - (b) Identify what a given transformation is (translation, rotation, scaling, etc)
 - (c) Be able to construct the matrix associated with a given transformation (translation, rotation, scaling, etc)
 - (d) Compute the determinant of a 2 by 2 matrix or larger triangular matrix
 - (e) Determine if a matrix is invertible based on the determinant

4 Lecture Based Problems

1. Explain what a span is and demonstrate a vector is in a span of other vectors
2. Explain the difference between linear dependence and independence
3. Explain what it means for a linear transformation to be Injective (one-to-one) and Surjective (onto).
4. Explain the properties of a determinant and methods to compute it.
5. Be able to read Python Code from Labs 1 and 2 and describe what it does.