

# 1 Math 225 M1 Exam 2 Review

Exam 2 will cover Chapter 3 sections: 3.1, 3.2, 3.3 and Chapter 4 sections: 4.1, 4.2, 4.3, 4.5, 4.6

The exam will consist of seven questions, some having multiple parts. Each question will be worth 10 points.

## Definitions

- \* The definition of  $\mathbb{P}_n$  (p. 219)
- \* Subspace of a vector space (p. 220)
- \* The null space of a matrix (p. 226)
- \* The column space of a matrix (p. 229)
- \* Basis of a vector (sub)space (p. 238)
- \* Dimension of a vector space (p. 257)
- \* The row space of a matrix (p. 263)

I may ask you to state any of the following theorems. This may seem like a lot, but most of these are short and knowing them will definitely help you with the rest of the exam and the course.

## Theorems:

- \* Theorem 1 (p. 188)
- \* Theorem 2 (p. 189)
- \* Theorem 4 (p. 194)
- \* Theorems 5,6 (p. 196)
- \* Theorem 2 (p. 227)
- \* Theorem 3 (p. 229)
- \* Theorem 5 - "The Spanning Set Theorem" (p. 239)
- \* Theorem 6 (p. 241)

- \* Theorem 9 (p. 257)
- \* Theorem 10 (p. 257)
- \* Theorem 12 - "The Basis Theorem" (p. 259)
- \* Theorem 14 - "The Rank Theorem" (p. 265)

**"Skills:"**

- \* Apply the Rank Theorem to problems. Practice problems: 4.6: 1 through 16
- \* Compute determinants using cofactor expansion across rows or columns. Practice problems: 3.1: 1 - 13
- \* Determine if a subset of a vector space is a subspace. Practice problems: 4.1: 5, 6, 7, 8, 9, 10
- \* Finding a basis and the dimension of the Null and Column spaces of a matrix, as well as finding examples of vectors in the Null and Column space. Practice Problems: 4.2: 9, 10, 13, 14. 4.5: 13, 14, 15, 16, 17, 18
- \* Finding matrices whose Column space is a specific set, or finding basis for subsets of  $\mathbb{R}^n$ . Practice problems: 4.2: 15, 16. 4.3: 11, 12