Final Exam Review Sheet
MATH 105, Winter 2006

This exam will cover section 6.1-8.3, 9.1-9.6, 1.1, 1.2, and 2.1-3.3 in your text. In preparing for the exam, you should review previous exams, quizzes, your returned homework, previous review sheets, and pay special attention to the topics listed below. You will be allowed one double-sided 8.5 × 11 sheet of paper with hand-written notes in your own hand writing.

- Chapter 6: Sets and Counting Techniques
  1. Finding set unions, intersections, complements, and identifying subsets.
  2. Using Venn diagrams to identify sets and count with sets.
  3. Applying the multiplication principle of counting.
  5. Counting with combinations (where order does not matter).

- Chapter 7: Probability
  1. Finding sample spaces and assigning probabilities to outcomes.
  2. Working with the probability rules for unions and complements.
  3. Using counting techniques to find probabilities.
  4. Independent events and the intersection rule.
  5. Creating tree diagrams for probability problems.

- Chapter 8: Additional Probability Topics
  1. Using Bayes’ formula or trees to compute Bayesian probabilities.
  2. Identifying and computing probabilities for Bernoulli trials using the binomial probability formula.
  3. Computing expected value for Bernoulli trials.
  4. Computing expected values by constructing an expected value table.

- Chapter 9: Statistics
  1. Computing means, medians, modes, and standard deviations for data sets.
  2. Constructing frequency tables and histograms for data sets.
  3. Computing z-scores and using them to determine area under a normal curve. (table will be provided)
  4. Using the normal distribution to approximate the binomial distribution.

- Chapter 1: Linear Equations
  1. Graphing lines using either the general form ($x$- and $y$-intercepts) or the slope-intercept (slope and intercept) form.
  2. Finding the equation of a line from a graph, pair of points, slope and point, or a point and relationship (parallel or perpendicular) to a given line.
Chapter 2: Systems of Linear Equations and Matrices

1. Solving systems of equations using substitution, elimination, an augmented matrix and row reduction, or the matrix equation \( AX = B \).
2. Identifying consistent, inconsistent, dependent, and independent systems of equations.
3. Identifying matrices in row echelon or reduced row echelon form.
4. Setting up systems of equations in two or three variables from a given story problem.
5. Matrix arithmetic (addition, subtraction, matrix and scalar multiplication).

Chapter 3: Linear Programming

1. Graphing regions defined by systems of linear inequalities.
2. Finding corner points for regions defined by systems of linear inequalities.
3. Identifying regions defined by systems of linear inequalities as either bounded or unbounded.
5. Setting up linear programming problems from a given story problem.

Below is a list of sample problems from the last chapter. Please refer to previous review sheets and exams for problems from other chapters.

1. Graph the region bounded by the following inequalities, identify the corner points, and indicate if the region is bounded or unbounded.

   (a) \(3x + 5y \leq 15\)  
   \(2x + y \leq 6\)  
   \(x \geq 0, \ y \geq 0\)

   (b) \(7x + 2y \geq 14\)  
   \(5x + 2y \leq 20\)  
   \(x \geq 0, \ y \geq 0\)

   (c) \(2x + 5y \leq 10\)  
   \(\ -3x + 6y \geq 9\)  
   \(x \geq 0, \ y \geq 0\)

2. Maximize or minimize the given objective function on each region above, as indicated.

   (a) Maximize \(5x + 3y\).

   (b) Minimize \(3x - 2y\).

   (c) Maximize \(2x - 6y\).

3. Solve the following linear programming problems.

   (a) A toy maker produces two types of hand-made trucks: a small truck and a large truck. The small truck takes 1 oz. of steel and 2 oz. of plastic. The large truck takes 3 oz. of steel and 1 oz. of plastic. There is a supply of 13 oz. of steel and 11 oz. of plastic on hand. The toy maker is currently out of both types of trucks and must make at least one of each to restock the shelves. If he makes a profit of $100 on the large trucks and $60 on the small trucks, how many of each type of truck should he make to maximize his profit, and what will that profit be?

   (b) A concrete mixing firm offers two versions of mix. Each ton of standard mix requires 0.30 tons of sand and 0.50 tons of limestone and sells for $500. Each ton of super mix requires 0.35 tons of sand and 0.55 tons of limestone and sells for $720. Each day there are 160 tons of sand and 70 tons of limestone available. The firm has an ongoing contract to provide 2 tons of standard mix a day to a local construction company. How many tons of each type of mix should the firm make to maximize the sales amount?