Exam III Review Sheet  
MATH 105, Winter 2005

This exam will cover sections 9.6, 1.1-1.3, and 2.1-2.3 in your text. You should know general terms and definitions from each of these sections, review the homework and quizzes given for these sections, and pay particular attention to the subjects and practice problems mentioned below.

1. Compute Z-scores and use them to determine area under a normal curve from tables.
2. Using the normal distribution to approximate the binomial distribution.
3. Graphing lines from given equations.
4. Finding the equation of a line from: a graph, two points, or a point and a slope.
5. Finding the equation of a line parallel or perpendicular to a given line.
6. Using lines to predict, solve break-even problems, and solve mixture problems.
7. Solving a system of equations using substitution or elimination.
8. Finding the augmented matrix for a system of equations.
9. Identifying matrices in row echelon or reduced echelon form.
10. Solving a system of equations using augmented matrices and row operations.
11. Setting up systems of equations in two or three variables from a given story problem.
12. Identifying systems of equations as: consistent and dependent, consistent and independent, or inconsistent.

Below is a list of sample problems. This list is not all-inclusive, but does represent the basic types of problems you may see on the exam.

1. A student takes a multiple choice test made up of 50 questions. Each question has five possible answers, one of which is correct. What is the probability that guessing will get him a score of at least 15 out of 50? Use a normal distribution to approximate this answer.

2. Suppose that the weights, in pounds, of a certain group of individuals follows a normal distribution \( \mu = 175 \) and \( \sigma = 12.5 \). If an individual is selected from this group at random, find:
   (a) the probability that the individual weighs more than 175 pounds.
   (b) the probability that the individual weighs between 162.5 and 187.5. (Hint: no table required!)
   (c) the probability that the individual weighs between 155 and 175.
   (d) the probability that the individual weighs less than 155 pounds.
   (e) the probability that the individual weighs between 190 and 210.

3. Find the slope, \( x- \), and \( y- \)intercept of each line below. Then graph each line.
   (a) \( 10x + 15y = 60 \)
   (b) \( 7x - 5y = -35 \)
   (c) \( -6x + 3y = 12 \)
4. Determine the solution type for each of the following systems of linear equations. For those with a unique solution, find that solution using one of the elimination, substitution, or matrix methods. You should use each method at least once.

\[
\begin{align*}
2x + 6y &= 44 \\
-3x + 5y &= 32 \\
4x + 6y &= 12 \\
2x + 3y &= 6 \\
2x + y + z &= 6 \\
x - y - z &= -3 \\
3x + y + 2z &= 7 \\
8x - 32y &= 15 \\
4x - 16y &= 21 \\
5x - \frac{1}{2}y &= -16 \\
\frac{1}{3}x + 7y &= 13 \\
z + y - z &= 0 \\
4x + 4x - 4z &= -1 \\
2x + y + z &= 2
\end{align*}
\]

5. Identify each matrix as being in row echelon form, reduced echelon form, or neither. If a matrix is in neither form, indicate what keeps it from being both row echelon and reduced echelon form.

\[
\begin{align*}
\begin{bmatrix} 1 & 2 & 0 & 4 \\ 0 & 1 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix} & \quad \begin{bmatrix} 1 & 2 & 0 & 4 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 3 \end{bmatrix} \\
\begin{bmatrix} 1 & 0 & 2 & 3 \\ 0 & 0 & 3 & -1 \end{bmatrix}
\end{align*}
\]

6. Set-up and solve the following story problems involving systems of equations.

(a) A pet food company makes two types of dog food—Hearty Blend and Nature’s Best. The Hearty Blend mixture requires 3 lbs. of rice and 6 lbs. of meat per 10 lb. bag. The Nature’s Best mixture takes 5 lbs. of rice and 4 lbs. of meat per 10 lb. bag. The factory has 135 lbs. of rice and 180 lbs. of meat ready. How many 10 lb. bags of each blend should be made to use up the factory’s supply?

(b) Herbert and Gertrude’s Trail Mix Company makes two types of trail mix. The first mix uses 2 oz. of nuts and 1 oz. of chocolates per package. The second type requires 1 oz. of nuts and 3 oz. of chocolates per package. If they have 45 oz. of nuts and 30 oz. of chocolates, how many packages of each type should they make to exactly use their supply of nuts and chocolates?

(c) Sally’s Girl Scout troupe is selling cookies for the Christmas season. There are three different kinds of cookies in three different containers: bags hold 1 dozen chocolate chip and 1 dozen oatmeal; gift boxes contain 2 dozen chocolate chip, 1 dozen mint, and 1 dozen oatmeal cookies; and cookie tins hold 3 dozen mint and 2 dozen chocolate chip cookies. Sally’s mother is having a Christmas party and wants 6 dozen oatmeal; 10 dozen mint, and 14 dozen chocolate chip cookies. How can Sally fill her mother’s order?

(d) A store sells almonds for $6 per pound, cashews for $5 per pound, and peanuts for $2 per pound. One week the manager decides to prepare 100 16-ounce packages of nuts by mixing the peanuts, almonds, and cashews. Each package will be sold for $4. The mixture is to produce the same revenue as selling the nuts separately. Prepare a table that shows some of the possible ways the manager can prepare the mixture.