

**MATH 1711, SUMMER 2000****TEST 2**

July 7, 2000

Print your name on this page **ONLY!!!**

Name: \_\_\_\_\_

This test is closed book, closed notes. You may **NOT** use a calculator.  
**READ ALL DIRECTIONS CAREFULLY!.**

There are eight problems and one bonus on this test for a total of 105 possible points. Work all of the first three problems (numbers 1-3). Then work only 4 of the remaining 5 problems (numbers 4-8). Be sure to clearly indicate which problem you do not want graded.

**SHOW ALL YOUR WORK TO RECEIVE CREDIT!!!** Answers without sufficient supporting work will receive **NO CREDIT**.

A formula sheet and standard normal table can be found on the last page of this test. Please feel free to tear it off.

**This test is double-sided!**

WORK ALL OF THE FIRST THREE PROBLEMS (NUMBERS 1-3).

1. A multiple-choice test consists of 5 questions, each of which has a choice of four answers (only one of which is correct). A student guesses answers at random. Let  $X$  denote the number of questions the student answers correctly.

(a) (12 points) Find the probability distribution for  $X$ . You do not need to simplify your probabilities.

(b) (12 points) What is the expected value of  $X$ ?

2. (12 points) Given the matrices below:

$$A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} -3 & -4 & 0 \\ 1 & -2 & 2 \end{bmatrix}, \quad C = \begin{bmatrix} -1 & -4 \\ -3 & 3 \\ 2 & 0 \end{bmatrix},$$

find  $2A + BC$ .

3. (16 points) Solve the following system using the matrix elimination method. You should continue your row operations until the matrix is in echelon form. ANY OTHER METHOD WILL RECEIVE NO CREDIT!

$$x + z = 1$$

$$2x + y = 1$$

$$y - z = -2$$

WORK ONLY FOUR (4) OF THE LAST FIVE PROBLEMS (NUMBERS 4-8).  
WRITE "OMIT" NEXT TO THE PROBLEM YOU DO NOT WANT GRADED. IF  
YOU DO NOT INDICATE WHICH PROBLEM YOU WISH TO OMIT, THEN ONLY  
THE FIRST FOUR PROBLEMS WILL BE GRADED.

4. (12 points) A baseball player hits a home run with probability 0.06. What is the probability that he will hit a home run in a given game with 4 times at bat? You do not need to simplify your final answer.

5. (12 points) Graph the feasible set of the following system of linear inequalities. Shade the region which consists of those points that do not belong to the feasible set. Be sure to label all the vertices of your feasible set.

$$x + 3y \leq 6$$

$$x - y \leq 2$$

$$-5x + y \leq 2$$

6. (12 points) The recovery rate for a certain cattle disease is  $\frac{1}{3}$ . If 450 cattle are affected, what is the probability that at least 135 will recover?

7. (12 points) The augmented matrices below were obtained by solving a system of linear equations with the unknowns  $x$ ,  $y$ , and  $z$  using the Gaussian elimination method.

$$A = \left[ \begin{array}{ccc|c} 1 & 0 & 2 & 4 \\ 0 & 1 & 1 & 3 \end{array} \right], \quad B = \left[ \begin{array}{ccc|c} 1 & 0 & 0 & 4 \\ 0 & 1 & -2 & -4 \\ 0 & 0 & 0 & 3 \end{array} \right].$$

Give the solution to each system determined by the matrices  $A$  and  $B$ .

8. (12 points) Suppose you wish to find the least-squares line for a given data set. What does the least-squares line tell us? How do you know which line gives the "best" fit?

**BONUS** (5 points): Let  $X$  be a random variable having a normal distribution with mean 2 and standard deviation  $\frac{1}{2}$ . Find  $x$  such that  $Pr(-x + 2 \leq X \leq x + 2) = .1586$ .