

Instructor: Prof. A. Suci

Name: _____

MTH 1101 — MIDTERM EXAM — FALL 1996

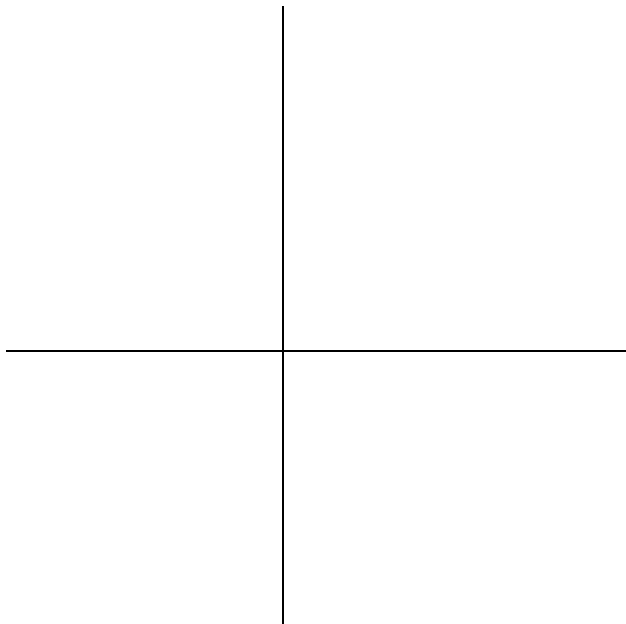
Instructions: Put your name in the blanks above. Put your final answers to each question in the designated spaces on these test pages. Show your work—if there is not enough room, use the back of the page.

1. SET UP a linear program to solve the following problem. Be sure to identify the action variables, **ALL** the constraints, and the objective function. **DO NOT SOLVE.**

A candy company has 100 lb of chocolate-covered nuts and 125 lb of chocolate-covered raisins to be sold as two different mixtures. One mix will contain half nuts and half raisins and will sell for \$6 per pound. The other mix will contain $\frac{1}{3}$ nuts and $\frac{2}{3}$ raisins and will sell for \$4.80 per pound. How many pounds of each mix should the company prepare in order to make the most profit?

2. Solve the system of linear inequalities **and** shade the solution set.

$$x \leq 3 \quad y \geq -1 \quad 2x + y \geq 2$$



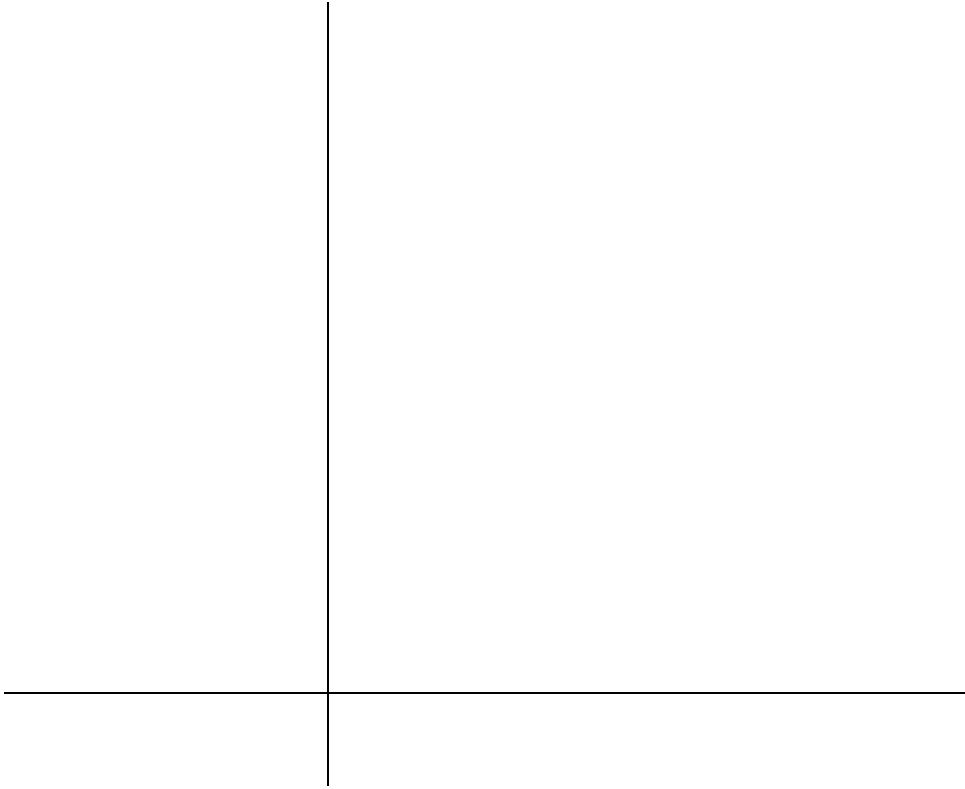
3. Compute: $\begin{bmatrix} 3 & 1 & -4 & 0 \\ 1 & 6 & 0 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & -1 & 4 \\ 0 & 1 & 2 \\ 5 & 0 & 2 \\ 0 & -3 & 5 \end{bmatrix} =$

4. Compute: $-4 \cdot \begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 0 \\ 2 & 0 & -1 \end{bmatrix} + 3 \cdot \begin{bmatrix} 5 & 3 & 0 \\ 7 & -2 & 1 \\ 1 & 2 & 4 \end{bmatrix} =$

5. Find the inverse of $A = \begin{bmatrix} 7 & -2 \\ -15 & 5 \end{bmatrix}$.

6. Find the maximum and minimum values of $F = 3x + 2y$, subject to the constraints

$$x \leq 2, \quad y \geq 0, \quad -2x + y \leq 0, \quad x + y \geq 1 \quad x + y \leq 3.$$



Answer:

The maximum value of F equals _____, and it occurs at the point (____, ____).

The minimum value of F equals _____, and it occurs at the point (____, ____).

7. The message $\{-15, -6, -4, -2, 28, 18, -24, -12, -4, 2, 10, 0\}$ was encoded using the matrix $M = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ and the following key:

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>
1	-1	2	-2	3	-3	4	-4	5	-5	6	-6	7	-7
<i>O</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>	<i>V</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>	-	
8	-8	9	-9	10	-10	11	-11	12	-12	13	-13	0	

a. What matrix is needed for decoding the message?

b. What is the message?

Answer: The message is: _____.