

MATH 140. TEST 3 (SPRING 2005. HARVEY).

Name (5 points): _____

No notes or texts allowed. You may use a TI-83, TI-84, TI-86 or equivalent calculator. Show all work.

1 (6 points). Find the solution to this system of equations:

$$\begin{cases} x - y = 3 \\ 2x - 3y = -3 \end{cases}$$

2 (10 points). Find the solution to this system of equations:

$$\begin{cases} x + y + 2z = 9 \\ 2x + y + z = 10 \\ x + 3z = 7 \end{cases}$$

3 (8 points). You are offered two jobs as a salesperson. One company offers an annual salary of \$25,000 plus a year end bonus of 2% of your total sales. The other company offers an annual salary of \$20,000 plus a year end bonus of 3% of your total sales. Determine the annual sales required to make the second offer better.

4 (10 points). Graph the solution set of the system of inequalities:

$$\begin{cases} x \geq 0 \\ x + y \geq 0 \\ x^2 + y \leq 2 \end{cases}$$

Label all corner (intersection) points.

5 (10 points). Find the maximum value of the objective function $z = x + 2y$ on the region satisfying the following inequalities:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y \leq 5 \\ x + 4y \leq 8 \end{cases}$$

6 (8 points). Consider the following *dependent* system. Write the augmented matrix and use matrix row reduction to find the solution set of this system. Show your work:

$$\begin{cases} x + y + z = 1 \\ x + 2y - 3z = 0 \\ 2x + y + 6z = 3 \end{cases}$$

7 (6 points). Perform the indicated matrix arithmetic:

$$\begin{pmatrix} 2 & 3 \\ 3 & 1 \end{pmatrix} + 3 \begin{pmatrix} 4 & -1 \\ 2 & 0 \end{pmatrix}$$

8 (6 points). Solve for x , y , z , and w :

$$\begin{pmatrix} x & 2 \\ 4 & 1 \end{pmatrix} + \begin{pmatrix} 0 & 2 \\ 1 & 1 \end{pmatrix} = \begin{pmatrix} 5 & 4 \\ 1 & 1 \end{pmatrix} = \begin{pmatrix} y & 12 \\ z & w \end{pmatrix}$$

9 (8 points).

$$A = \begin{pmatrix} 1 & 3 & 5 \\ 2 & 0 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 1 \\ 4 & 4 \\ 2 & 4 \end{pmatrix}$$

Calculate both $A \times B$ and $B \times A$ (if possible).

10 (10 points).

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 1 & 4 & 1 \end{pmatrix}$$

Compute A^{-1} . Show your work (no calculator).

11 (8 points). Solve the matrix equation (find x and y):

$$\begin{pmatrix} 4 & 3 \\ 3 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$$

(you may use your calculators for this).

12 (10 points).

$$M = \begin{pmatrix} 1 & 3 & 2 \\ 2 & 0 & 1 \\ 4 & 1 & 1 \end{pmatrix}$$

What are the minors M_{21} , M_{22} and M_{23} ? What are the cofactors A_{21} , A_{22} and A_{23} ? What is the determinant of M ?