

Exam #1
Math 111
February 25, 2005

Name _____

All questions are worth an equal number of points. All work is to be done on the blank paper provided. At the end of the exam, please hand in this sheet, together with all of your work.

§1 Calculation

1. Graph the feasible set for the system of inequalities

$$\begin{cases} y \leq 2x - 4, \\ y \geq 0, \\ x \leq 4. \end{cases}$$

2. Find the y -intercept of the line passing through $(5, 6)$ and having slope $\frac{3}{5}$.

3. Use Gaussian elimination to solve the system

$$\begin{cases} 2x - 6y = -8 \\ -5x + 13y = 1. \end{cases}$$

4. Find all solutions of

$$\begin{cases} x - 7y + z = 3 \\ 2x - 14y + 3z = 4. \end{cases}$$

5. Find the inverse of the matrix

$$A = \begin{bmatrix} 4 & -2 & 3 \\ 8 & -3 & 5 \\ 7 & -2 & 4 \end{bmatrix}.$$

§2 Comprehension

6. What is the geometric definition of slope?
7. What are the elementary row operations?
8. When are you allowed to multiply two matrices? Give an example of a pair of matrices A and B so that the product AB is defined (calculate it!) and so that the product BA is not defined.

§3 Application

9. For tax purposes, businesses must keep track of the current value of their assets. A common mathematical model is to assume that the current value y is related to the age x of the asset by a linear equation. A moving company buys a 40-foot van with a useful life of 5 years. After x months of use, the value y of the van is estimated by the linear equation

$$y = 25,000 - 400x.$$

- a. Sketch the graph of this linear equation.
- b. What is the value of the van after 5 years?
- c. What economic interpretation can be given to the y -intercept of the graph?
10. An appliance store sells a 13" TV for \$90 and a 19" TV of the same brand for \$120. During a one-week period the store sold 5 more 19" TVs than 13" TVs and collected \$4800. How many televisions of each type were sold?