

Math 1414  
College Algebra  
Lab Exercise # 8  
Dr. Word

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

Date: \_\_\_\_\_

Section: \_\_\_\_\_

Semester: \_\_\_\_\_

Grade: \_\_\_\_\_

**Attach computer printouts to this sheet and submit your assignment to your instructor or the lab supervisor by Friday of the week assigned.**

Problems were taken from the College Algebra 3<sup>rd</sup> edition text, Larson/Hosteler, DC Heath 1993.

**Print the results of the following:**

8a. The matrix P with row one (0.6, 0.1, 0.1), row two (0.2, 0.7, 0.1), and row three (0.2, 0.2, 0.8) is called a stochastic matrix. Enter the 3 x 3 matrix into the TI-83. Each entry  $p_{ij}$  ( $i \neq j$ ) represents the proportion of the voting population that changes from party  $i$  to party  $j$  and  $p_{ij}$  represents the proportion of the population that remains loyal to the party from one election to the next. Find  $P^2$ . (This matrix gives the transition probabilities from the first election to the third.)

8b. Use the matrix P from 8a. to find  $P^3, P^4$ , just print out the graph for  $P^4$ . Describe the pattern noted for the higher powers of P.

8c. Three iron alloys contain the following percents of carbon, chromium, and iron:

	Alloy x	Alloy y	Alloy z
Carbon	1%	1%	4%
Chromium	0%	15%	3%
Iron	99%	84%	93%

Alloy x is a type of wrought iron, Alloy y is a type of stainless steel, and Alloy z is a type of cast iron. Use the TI-83 and the inverse matrix method. ( $Ax = B$ ) to determine how much of the three alloys can be made with 15 tons of carbon, 39 tons of chromium, and 546 tons of iron. Print the results and interpret your results.

8d. The area of a triangle with vertices  $(x_1, y_1), (x_2, y_2),$  and  $(x_3, y_3)$  given by  $\text{Area} = \pm \frac{1}{2} \det(A)$  where A in the matrix with row one  $(x_1, y_1, 1)$ , row two  $(x_2, y_2, 1)$ , and row three  $(x_3, y_3, 1)$  where the symbol  $(\pm)$  indicates the appropriate sign should be chosen to yield a positive area. A triangular tract of land is purchased. To estimate the number of square feet in the tract, you start at on vertex (20, 0) and walk 65 ft. east, and 50 ft north (85, 50). Then, from the second vertex you walk 85 ft. west and 30 ft. north (0, 80). Use the TI-83 and the above formula to determine the area of the tract.

**College Algebra:            Lab #8**

**\*\*\*If in doubt, Print it out!\*\*\***

8a) Refer to Lab 7 for directions on how to enter a new matrix.

8b) To find the matrix raised to a certain power just press [MATRX], select the built matrix, press [ENTER], then the [^] button and the given power.

8c) Enter the new data into a matrix into the matrix editor like previously. Enter in the given values of the total amount of each alloy in a new 3 x 1 matrix. Remember what each of the matrices are labeled. Refer to your book on how to solve  $Ax = B$ . Remembering how to raise a matrix to a power (inverse would be -1) like as in 8b. Your final results will be for x.

8d) Enter in these data points like before to build a 3 x 3 matrix. To find the determinant of the matrix go to [MATRX], scroll to MATH, then 1:det( , when at the home screen hit [MATRX] again and select the matrix you are dealing with. Multiply the answer by  $\pm \frac{1}{2}$ . Print your calculations.