Vectors and Matrices

1. Write a program that reads a 3x3 matrix of integers and multiplies the

elements of the main diagonal of the matrix by a number k. Print the matrix

on the screen before and after the multiplication.

2. Write a program that reads two 2x2 matrices A and B of integers and prints the

matrix C which is the sum of matrices A and B.

3. Write a program that reads the dimensions of two matrices A and B, and then reads

the two matrices (the elements must be integers). If the matrices are of compatible sizes for multiplication, multiply the matrices. Print the

matrices A, B and the matrix resulting from the multiplication.

4. Write a program that reads a 3x3 matrix of integers and returns the row with the

largest sum. Print the matrix, the row with the largest sum and the sum on the screen. 5. Write a program that reads the order of a square matrix A (up to 100), then reads its values and writes its transpose AT, where AT[i][j] =

A[j][i]

6. A go-kart track allows 10 laps for each of 6 racers. Write a

program that reads the names and times (in seconds) of each lap of each

race and stores the information in a matrix. At the end, the program should

inform:

A. Who had the best lap of the race, and in which lap

B. Final classification in order (1st, the champion)

C. Which lap had the fastest average

7. Write a program that reads a 6x3 matrix with real numbers, calculates and

displays:

(a) the largest element of the matrix and its respective position (row and column);

(b) the smallest element of the matrix and its respective position. 8. Write a program that reads two matrices A and B of integers and checks if both are inverses (i.e., if the multiplication of A by B is the identity matrix). 9. Write a program that reads a 3x3 matrix that represents a tic-tac-toe board and indicates which position should be played to win the game (if possible) or at least avoid a defeat. 10. Write a program that reads two grades for each student in two classes. Each class has 3 students. Store the data in a matrix M. Each student must have three grades (the two entered and the average of these two). Calculate the average of each class and store it in a vector CLASS. Report which class has the highest average, and which students had an average higher than the average of their class.