

# DATA STRUCTURES – PASSENGER SYSTEM PROJECT

(Arrays, Matrices, Methods, Classes, Random Numbers)

It is planned to place 40 passengers on a tour bus. Write the code that performs the operations specified in the following items:

- Creating a Distance Matrix:** 40 passengers are assumed to have known degrees of proximity to each other. Write the method that generates and returns the values containing the degree of proximity between the passenger pairs, consisting of random double numbers between 0 and 10, in DM, i.e. Distance matrix (40x40) (Table 1). Assign passenger names (first and last names) to an array of 40 elements.
- Placing Passengers in Seats** (Write the method of placing passengers in seats)
  - Generate a random number and assign to seat 1 the passenger at that index of the array. In seat 2, using the distance matrix, assign the passenger who is the least distance from the passenger placed in seat 1. In seats 3 and 4, assign the passengers who are the least distance from the passenger placed in the seat to their left among the remaining passengers. In the second row, for seat 5, assign the passenger whose total distance to the passenger in the seat immediately above (in front of) and diagonally above (1 and 2) is the least. For seat 6, assign the passenger with the least total distance to the passengers in seats 5, 1, 2 and 3; for seat 7, assign the passenger with the least total distance to the passengers in seats 6, 2, 3 and 4; for seat 8, assign the passenger with the least total distance to the passengers in seats 7, 3 and 4. Assignments will be made taking into account passengers other than those who have settled. Repeat this procedure until all passengers are seated.
- List** the passengers on the screen in the form of a 4x10 matrix with Passenger numbers and Passenger names on the seats in the order of the seat layout in Table 2.
- List** the total distances (left side + top (front) + top left diagonal + top left diagonal + top right diagonal) of the passengers placed on the seats according to the calculation in item b, again above the seats in the seat layout. If there are no seats in the relevant direction, a value of 0 will be taken for that direction.
- Print** the sum of the distances between passengers settled according to item b (**sum of distances for all passengers**). The only value required is the sum of the values in item d.

**Table 1:** Representative distances between Passenger Pairs

Distance Matrix (DM)						
	0	1	2	3	...	39
0	0	1,2	0,5	4,7	...	4,9
1	1,2	0	3,1	2	...	4
2	0,5	3,1	0	6,1	...	1,9
3	4,7	2	6,1	0	...	3,5
...	...	...	...	...	0	...
39	4,9	4	1,9	3,5	...	0

$$DM[i,j]=DM[j,i]$$

(The distance from i to j is the same as the distance from j to i).

**Table 2:** Bus seat layout and numbers

