**In the name of GOD**

Principle Of Programming HW#4

Due date : Wednesday, December, 8, 23:55

1 - Random Array:

Write a function that given N (number of elements), a, b, makes an integer array with N integer numbers between a and b and returns the pointer to it. to see how to make a random number in C, search in google.

Prototype: int \* random\_array(int n, int a, int b); Example :

int \* arr;

arr = random\_array(5, 1, 9); // arr -> {1, 8, 2, 5, 3} free(arr);

arr = random\_array(8, -4, 99); // arr -> {0, 0, 0, 1, 98, 3, 68, 86} free(arr);

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2 - Vectors (Dynamic Arrays)

Vectors are arrays that change their size according to the count of elements that is in them. Write the following set of functions which get the pointer to head of the vector (and more arguments if necessary) and return the pointer to head of the same vector (because it might change). assume that your array can holds any data types so data’s size is given too. Vector’s size is given as a pointer because you must change that variable too.

a. void\* insert(void \*head, int \*size, void\* item, int dsize);

int \* arr = NULL;

int num = 4;

arr = insert(arr, &size, &num, sizeof (int));

//arr -> {4} size -> 1

num = 1;

arr = insert(arr, &size, &num, sizeof (int));

//arr -> {4,1} size -> 2

num = 4;

b.void\* delete(void \*head, int \*size, void\* item, int dsize);

arr = delete(arr, &size, \*num, sizeof (int));

// arr -> {1} size -> 1

num = 56;

arr = delete(arr, &size, \*num, sizeof (int));

// arr -> {1} size -> 1

free(arr);

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3 - Write a function that gets two int \*arr and swaps two arrays.

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4 - Write the following set of functions, to work with matrices:

a. Void\* make\_mat (int rows, int cols); (to make a matrix)

b. void\* init\_mat (int\* mat, int rows, int cols); (to get input from user and initialize a given matrix)

c. void\* mat\_transpose(int \* mat[], int mat\_rows, int mat\_cols, int \* mat\_res[])

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NOTE: Be careful . The size of arrays( or pointers ) in **all Questions** shall change **dynamically** . no fixed arrays are acceptable.

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Code neatly and use comments to explain your codes.

Upload your home works in this format:

HW[homework number]\_[student number].zip

Example: HW1\_9433597.zip

DO NOT WORRY ABOUT YOUR GRADES AND DO NOT COPY!

The thing we care most about is your hard work and progress. Just try your best and leave us the rest .

Best Regards