ECE 175: Computer Programming for Engineering Applications

**Lab Assignment #9**

**Relevant Programming Concepts:**

* Lists
* Random numbers

**Problem 1:** Create a dynamic list of integers. Your list should be initialized by the user who enters a set of integers from the keyboard.

Your program should work as follows.

Enter an integer: 6

Do you want to enter another integer (y/n)? y

Enter an integer: 3

Do you want to enter another integer (y/n)? y

Enter an integer: 7

Do you want to enter another integer (y/n)? n

The integers entered are: 6 3 7

Use the following structure in your code

typedef struct node\_s{

int x;

struct node\_s \*listp;

} node;

**Problem 2:** Shuffle the list of ints entered by the user.

Your program should

1. Ask the user to specify the number of element swaps swapCount that will be executed to randomize the list of ints.
2. Randomly swaps (the contents of) two nodes of the list swapCount times

To obtain a random number in [0, count] (count is the length of the list) use the following function

#include <stdio.h>

#include<stdlib.h>

#include<math.h>

#include <time.h>

int rand\_gen(int count){

double frac;

frac = (double)rand()/((double)RAND\_MAX+1);

return floor(count \* frac); //random number in [0, count]

}

Include the following in the main to randomize the seed for the random function.

srand((int)time(NULL)); // need only be applied once

* srand(int) randomizes the seed of the random number generator. A different seed will produce a different sequence of random numbers.
* time(NULL)obtains the current system time. Hence it changes at every execution.
* rand()generates a random number in the range 0 and RAND\_MAX.
* RAND\_MAX is a system-defined upper bound on the maximum number that can be produced by rand().

To swap the contents of two elements of the list write a function with this prototype

void swap(node \*pt, int i, int j);

pt is a pointer to the head of the list

i: the ith list element

j: the jth list element

Enter an integer:1

Do you want to continue (y/n)?y

Enter an integer:2

Do you want to continue (y/n)?y

Enter an integer:3

Do you want to continue (y/n)?y

Enter an integer:4

Do you want to continue (y/n)?y

Enter an integer:5

Do you want to continue (y/n)?y

Enter an integer:6

Do you want to continue (y/n)?n

1 2 3 4 5 6

Enter the number of swaps:1000

1 6 5 4 2 3