### Singly Linked List ( Due 06 Nov 2020 )

In this assignment you will be writing helper methods for the LinkedList class that we developed and test them. The following is the outline of the code that you will be submitting. For the time being assume that the data that you are handling are integers. Later on when you use objects of other classes you will write compare functions for those classes and you can use your LinkedList class as is. **You may not change the signature of any of these functions. But you may add as many helper functions as needed.**

class Link (object):

...

class LinkedList (object):

# create a linked list

def \_\_init\_\_ (self):

self.first = None

# get number of links

def get\_num\_links (self):

# add an item at the beginning of the list

def insert\_first (self, data):

# add an item at the end of a list

def insert\_last (self, data):

# add an item in an ordered list in ascending order

def insert\_in\_order (self, data):

# search in an unordered list, return None if not found

def find\_unordered (self, data):

# Search in an ordered list, return None if not found

def find\_ordered (self, data):

# Delete and return Link from an unordered list or None if not found

def delete\_link (self, data):

# String representation of data 10 items to a line, 2 spaces between data

def \_\_str\_\_ (self):

# Copy the contents of a list and return new list

def copy\_list (self):

# Reverse the contents of a list and return new list

def reverse\_list (self):

# Sort the contents of a list in ascending order and return new list

def sort\_list (self):

# Return True if a list is sorted in ascending order or False otherwise

def is\_sorted (self):

# Return True if a list is empty or False otherwise

def is\_empty (self):

# Merge two sorted lists and return new list in ascending order

def merge\_list (self, other):

# Test if two lists are equal, item by item and return True

def is\_equal (self, other):

# Return a new list, keeping only the first occurence of an element

# and removing all duplicates. Do not change the order of the elements.

def remove\_duplicates (self):

def main():

# Test methods insert\_first() and \_\_str\_\_() by adding more than

# 10 items to a list and printing it.

# Test method insert\_last()

# Test method insert\_in\_order()

# Test method get\_num\_links()

# Test method find\_unordered()

# Consider two cases - data is there, data is not there

# Test method find\_ordered()

# Consider two cases - data is there, data is not there

# Test method delete\_link()

# Consider two cases - data is there, data is not there

# Test method copy\_list()

# Test method reverse\_list()

# Test method sort\_list()

# Test method is\_sorted()

# Consider two cases - list is sorted, list is not sorted

# Test method is\_empty()

# Test method merge\_list()

# Test method is\_equal()

# Consider two cases - lists are equal, lists are not equal

# Test remove\_duplicates()

if \_\_name\_\_ == "\_\_main\_\_":

main()

For this assignment you may work with a partner. Both of you must read the paper on [Pair Programming](https://www.cs.utexas.edu/users/mitra/csFall2020/cs313/assgn/PairProg-CACM-1999.pdf) and abide by the ground rules as stated in that paper.

The file that you will be turning in will be called **TestLinkedList.py**. The file will have a header of the following form:

# File: TestLinkedList.py

# Description:

# Student Name:

# Student UT EID:

# Partner Name:

# Partner UT EID:

# Course Name: CS 313E

# Unique Number:

# Date Created:

# Date Last Modified:

If you are working with a partner you will be submitting only one program but make sure that you have your partner's name and eid in your program. If you are working alone, then remove the two lines that has the partner's name and eid in the header.

Use the [Canvas](http://canvas.utexas.edu/)system to submit your **TestLinkedList.py** file. We should receive your work by 11 PM on Friday, 06 Nov 2020. There will be substantial penalties if you do not adhere to the guidelines. Remember Python is case sensitive. The name of your file must match exactly what we have specified.

* Your Python program should have the proper header.
* Your code must run before submission.
* You should be submitting your file through the web based *Canvas* program. We will not accept files e-mailed to us.