

[CSIE] Data Structures: Homework 2022

Scope: CH 4

Note that this homework does not need to be handed in, and no score is calculated. Some of these questions may appear in the mid-term exam.

1. Complete the *length* function, which returns the number of nodes in a circular list.

```
int length (listPointer last)
{
    /* find the length of the circular list last */

}
```

2. Draw a diagram to represent a linked stack.
3. Let a be a pointer to a polynomial. Complete the function, *evalPoly*, to evaluate the polynomial a at point x , where x is some floating point number.

```
float evalPoly (float x, PolyPointer a)
{
    /* evaluate the polynomial at point x */

}
```

4. Complete the function that searches for an integer, num , in a circularly linked list. The function should return a pointer to the node that contains num if num is in the list and *NULL* otherwise.

```
listPointer searchList (int num, listPointer ptr)
{
    /* print out the contents of the list */

}
```

5. Determine whether the following statement is True or False, please explain in detail if the statement is False:
 - (a) The time complexity to find an arbitrary element in a singly linked list is $O(n)$, and the time complexity to find an arbitrary element in an array is $O(\log n)$, where n is the number of elements in the list and array.
 - (b) The space complexity of doubly linked list is $\Theta(n^2)$, where n is the number of elements in the list.