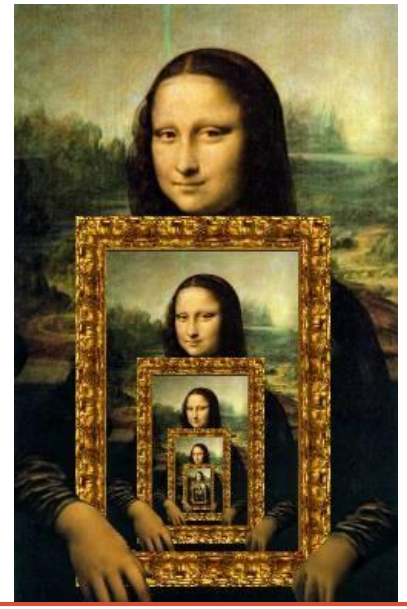
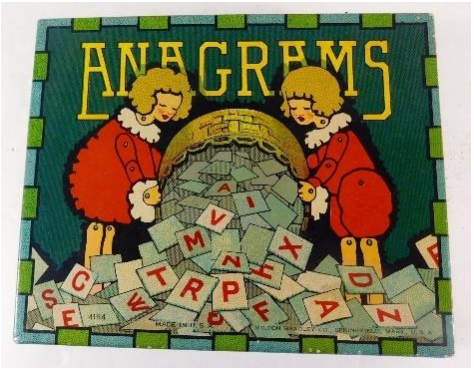
MORE STRINGS AND RECURSION



Problem Solving with Computers-I

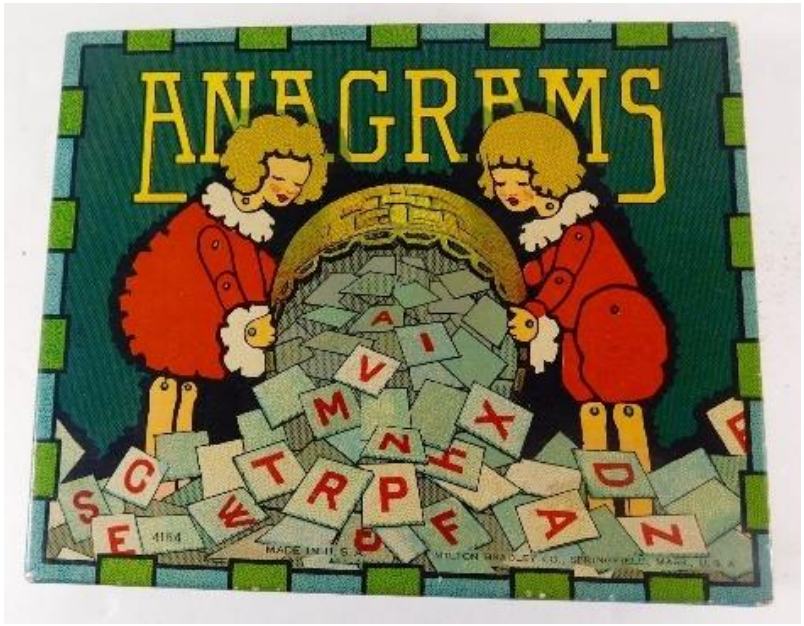
https://ucsb-cs16-sp17.github.io/



Lab 08: anagrams

bool isAnagram(string s1, string s2)

Diba == Adib
Rats and Mice == In cat's dream
Waitress == A stew, Sir?



Lab 08: Palindromes

```
bool isPalindrome(const string s1) //recursive
bool isPalindrome(const char *s1) //recursive
bool isPalindromeIterative(const char *s1) //iterative
```

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Understanding the arguments of isPalindrome

```
bool isPalindrome(const char *s1) //recursive
```

What is the data type of s1?

A. C string
B. String class object
C. A constant pointer
D. All of the above
E. Noe of the above

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Lab 08: Understanding the arguments of isPalindrome

```
bool isPalindrome(const char *s1) //recursive
```

Why don’t we pass the length of the string as a second parameter?

A. It can be inferred from s1 using the s1.length() method
B. It can be inferred from s1 using the function strlen(s1)
C. It is not required to determine if the string is a palindrome
D. There is an error in the function declaration, we need to specify the length as a second parameter

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Lab 08: Steps in a recursive implementation

bool isPalindrome(const char *s1) //recursive

1. What is the base case ?
2. What is the key assumption for the recursive step?
3. What is the recursive step?

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Dynamic memory allocation

- To allocate memory on the heap use the ‘new’ operator
- To free the memory use delete

```
int *p= new int;
delete p;
```

Dynamic arrays

```
int arr[5];
```

```
struct UndergradStudents{
    string firstName;
    string lastName;
    string major;
    double gpa[4];
};
```

Dangling pointers and memory leaks

- Dangling pointer: Pointer points to a memory location that no longer exists
- Memory leaks (tardy free)
  - Heap memory not deallocated before the end of program (more strict definition, potential problem)
  - Heap memory that can no longer be accessed (definitely a leak , must be avoided!)

Dynamic memory pitfall: Memory Leaks

- Memory leaks (tardy free)

Does calling foo() result in a memory leak? A. Yes B. No

```
void foo(){
        int * p = new int;

}
```

Q: Which of the following functions results in a dangling pointer?

```
int * f1(int num){
    int *mem1 =new int[num];
    return(mem1);
}
```

```
int * f2(int num){
     int mem2[num];
     return(mem2);
}
```

A. f1

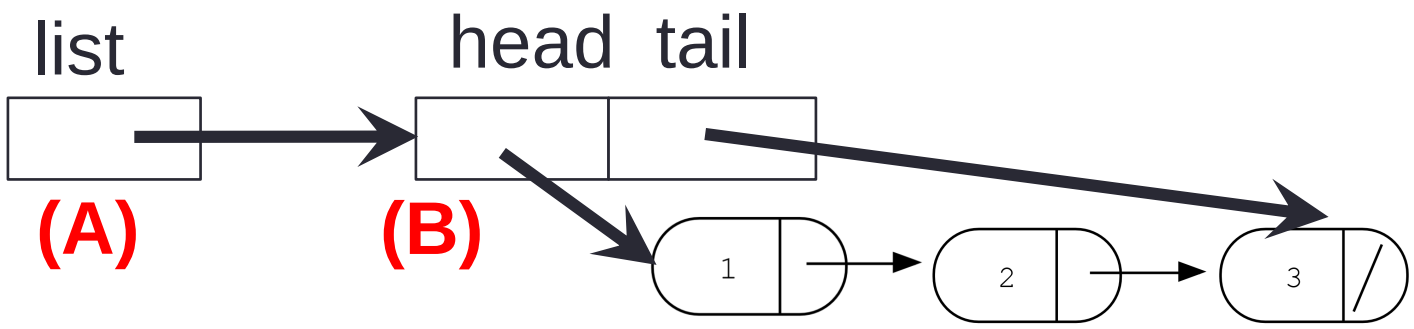
B. f2

C. Both

Deleting the list

int freeLinkedList(LinkedList * list){…}

Which data objects are deleted by the statement: **delete list;**



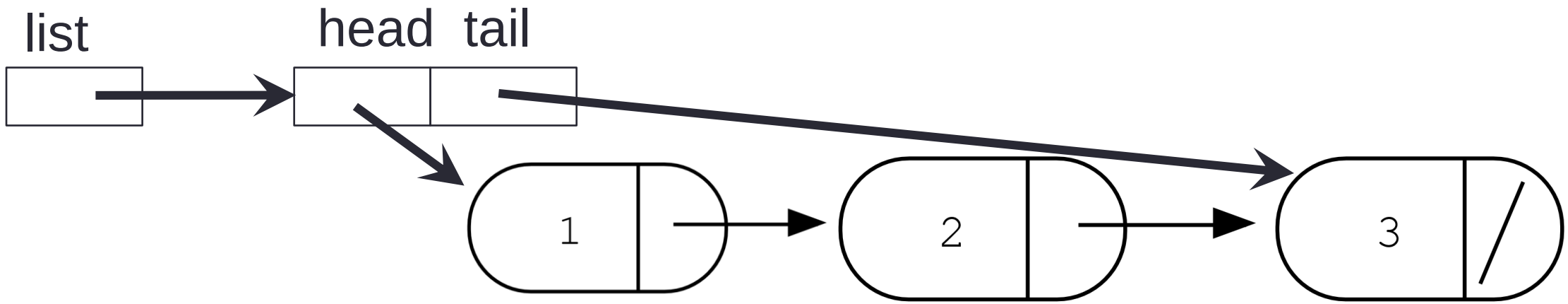
(C) All nodes of the linked list

(D) B and C

(E) All of the above

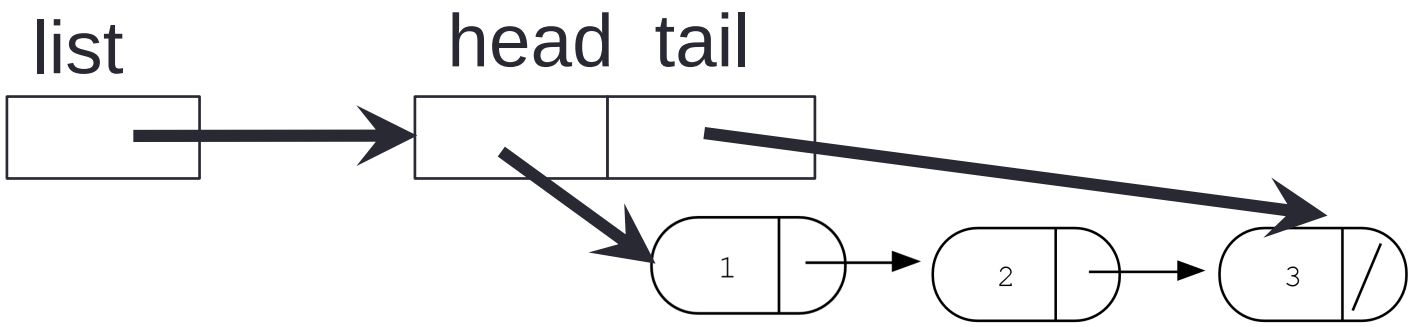
Does this result in a memory leak?

Delete node 2 in the list



Delete the list

int freeLinkedList(LinkedList * list);



Next time

- Advanced problems in recursion on linked-lists