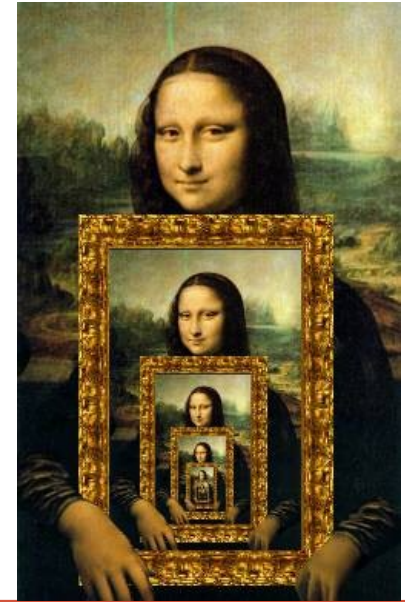


FINAL REVIEW



Problem Solving with Computers-I

C++

```
#include <iostream>
using namespace std;

int main(){
    cout<<"Hola Facebook!";
    return 0;
}
```

GitHub



Final Exam!

- Monday (12/10) noon to 3pm CHEM 1171
- Assigned seating (same as midterm 2)
- Everything we have covered so far is on the exam
- Duration: **3 hours**
- **Closed book: no calculators, no phones, no computers**
- Only 1 sheet (***double***-sided is ok) of written notes
 - Must be no bigger than 8.5" x 11"
 - You have to turn it in with the exam

Final Exam Resources

<https://ucsb-cs16-f18-mirza.github.io/exam/e03/>

Review

- Pointers
- Linked List
- Recursion

Take notes!

Pointers

1. What C++ unary operator is the "de-referencing" operator?
2. What C++ unary operator is the "address-of" operator?
3. Declare a variable p to be a pointer to a pointer to a character
4. Draw a pointer diagram to show the evolution of data in memory during the execution of the the following code:

A.

```
int a=6, b=7, *p1=&b, *p2=&a;  
p1 = p2;  
*p1 = 8;  
p2 = &b;
```

Draw pointer diagrams

B.

```
int a=2, b, *p1=&b, *p2=&a, *p3;  
p3 = p2;  
*p1 = 8;  
p2 = p1;  
p1 = p3;  
*p2 = 4;
```

C.

```
int a=2, b=3, *p1, *p2;  
p2 = &a;  
p1 = &b;  
*p1 = *p1 + *p2;
```

Draw pointer diagrams for the following code

7. (a) Draw a pointer diagram for the following code:

```
int *** p = new int**;  
*p = new int*;  
**p = new int;  
***p = 5;
```

(b) Write code to print the value of all objects created on the heap to standard output

Structs

8. Pointers and structs

Consider following declarations.

```
struct Actors {
```

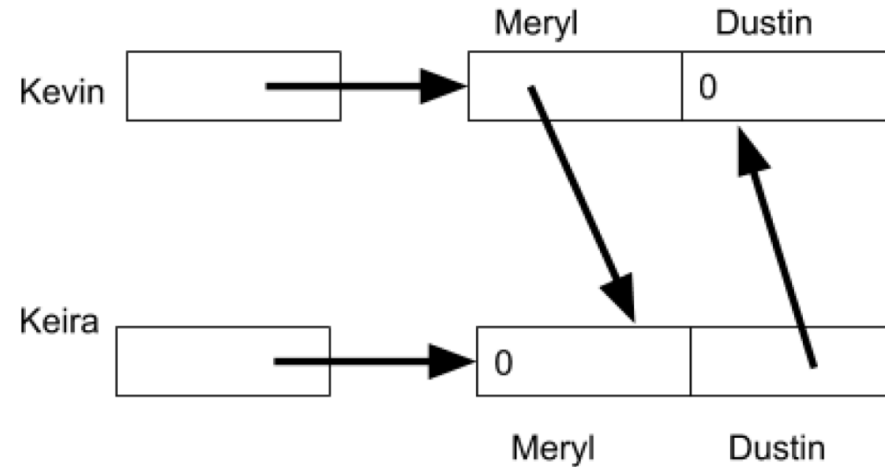
```
    Actors *Meryl;
```

```
    Actors *Dustin;
```

```
};
```

```
Actors *Kevin;
```

```
Actors *Keira;
```



Starting with the current state of memory shown above, consider the C++ code shown below. In the space to the right, draw the state of memory after this code executes?

```
Kevin->Meryl = NULL;
```

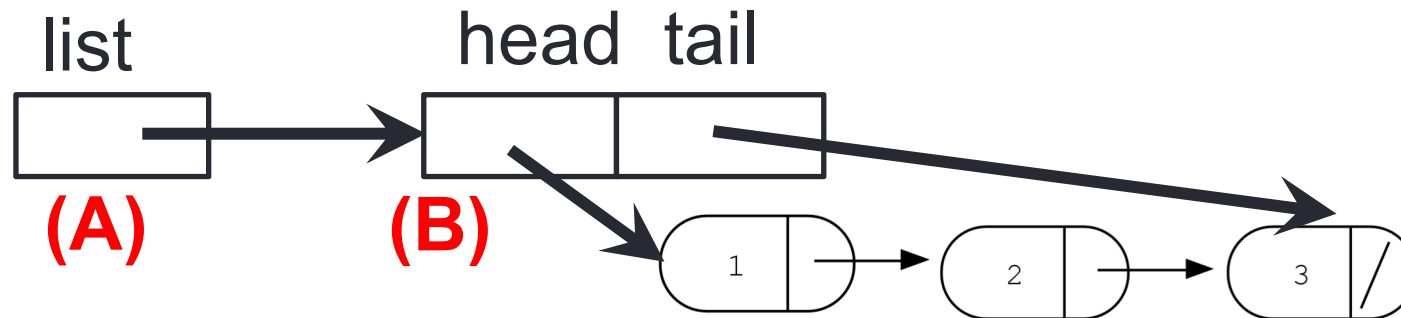
```
Kevin->Dustin = Keira;
```

```
Keira = Keira->Dustin;
```


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?

Recursion

Part 2. Recursion and arrays

1. [5 pts] What is the outcome of compiling and executing the following code. Assume it is embedded in an otherwise correct and complete C++ program

```
void printBackwards(int *arr, int len){
    if (len <=0) return;
    cout<<arr[len-1]<<" ";
    printBackwards(arr, len);
    arr = arr + 1;
    len = len - 1;
}

int main(){
    int arr[4] = {1, 2, 3, 4};
    printBackwards(arr, 4);
}
```

Recursion

3. CountPairs:

Let us define a "pair" to be two instances of the same character separated by any char.

Ex: "AxA" the A's make a pair.

Ex: "AAA" the first A and third A make a pair

Ex: "AA" is not considered a pair

Pair's can overlap, so "AxAxA" contains 3 pairs -- 2 for A and 1 for x.

Recursively compute the number of pairs in the given string. In this problem, you do not need to care about cases or punctuation.

Some comic relief...



	COMMENT	DATE
○	CREATED MAIN LOOP & TIMING CONTROL	14 HOURS AGO
○	ENABLED CONFIG FILE PARSING	9 HOURS AGO
○	MISC BUGFIXES	5 HOURS AGO
○	CODE ADDITIONS/EDITS	4 HOURS AGO
○	MORE CODE	4 HOURS AGO
○	HERE HAVE CODE	4 HOURS AGO
○	AAAAAAA	3 HOURS AGO
○	ADKFJSLKDFJSDKLFJ	3 HOURS AGO
○	MY HANDS ARE TYPING WORDS	2 HOURS AGO
○	HAAAAAAAAAANDS	2 HOURS AGO

AS A PROJECT DRAGS ON, MY GIT COMMIT
MESSAGES GET LESS AND LESS INFORMATIVE.

[HTTP://XKCD.COM/1296/](http://xkcd.com/1296/)

Some comic relief



[HTTP://XKCD.COM/138/](http://xkcd.com/138/)

Good luck with the final!