

SAMPLE Final Questions

CS 162: Introduction to Computer Science II

1) Fundamental Linked List Questions (25 points)

Given the following node structure:

```
struct node {  
    char * name;  
    char phone[21];  
    node * next;  
};
```

```
node * head;
```

a) Show the C++ code allocate memory for 1 node, dynamically

```
head = new node;
```

b) Now, show how to allocate memory for the name, sized just right

```
head->name = new char[some_size +1];
```

c) Show how to store your name and phone number in this node

```
char temp[100];  
cin.get(temp,100); cin.ignore();  
head = new node;
```

```
some_length = strlen(temp);  
head->name = new char[some_length +1];  
strcpy(head->name, temp);  
cin.get(head->phone,21); cin.ignore();
```

or you could have said:

```
strcpy(head->name, "Karla Fant");  
cin.get(head->phone,21); cin.ignore();
```

d) Show how to delete this one node

```
delete head; /* ***This deallocates the  
memory that head is pointing to....it does not  
delete any variable. Delete can't delete  
variables!!!!!!!!!! */
```

e) Now, how can you tell if the list is empty?
if (head == NULL) // if (!head) //empty

2. (25 points) Assume the following class builds a linear linked list:

2a. Write at least 4 prototypes and all of the data members for managing a LLL of names/phone #'s. You may use the node struct from the previous page.

***** All data must be obtained by the calling routine - NOT from the user! *****

```
class list {           // maintains a linked list
address book
    public:
//Create at least 4 member function prototypes here
```

private:

};

2b. Write the code for the constructor:

2c. Write the code for the destructor:

(25 points)

3. C++ Coding Questions.

Assume that you have a linear linked list of just integers

- a. Write the code to insert a node at the END of an existing linear linked list.**

b. Write the code to display every other integer in the linear linked list

c. Write the code to delete all nodes in a LLL

3. (25 points) Short Answer and pointer arithmetic

a. When should we pass pointers by reference?

Because you want to change it!

Write the code to insert a new name into the list, at the end (given only the head pointer -- not a tail pointer)

```
void ordered::insert(char nme[], char a_code[],  
char ph[]) {
```

3. (25 points) Pointer Questions

a) Assume that you need to pass a **pointer to an integer by reference** to a function (named **search_int**), what would the function call and the function prototype look like:

variable definitions: int * ptr;

function call: search_int(ptr);

function prototype:.....

void search_int(int * &);

b) Show how to allocate an array of 20 integers **dynamically** at run-time

ptr = new int [20];

c) Show how to later on, deallocate that same memory.

delete [] ptr;

c) Explain why we can't pass an "array" by reference:

An array is a constant pointer to the first element. You can't pass a constant by reference. It would be like trying to change the location of the actual array (sort of like moving a house)