

Name _____

Section (circle one, (2 pts)): 010 013 016
 011 014 017
 012 015 018

General Instructions

- DO NOT WRITE YOUR NAME ON ANY PAGE EXCEPT THIS ONE!
- You have 50 minutes
- **Pace Yourself!!!!**

Pay attention to the point values. When there are 10 minutes left, skim through and be sure you have at least written *something* for the questions that are worth many points.

- Read *all* the directions *carefully* on each problem.
- Good luck.

1. The following page contains a C++ program that creates a linked list using `struct Node` structures. This program also contains some other variables as well, just for illustrative purposes.

All of the questions on this page pertain to that program.

- (a) (20 pts) Fill in the following table, indicating the type of each expression. The first two are done for you as examples.

<i>expression</i>	<i>type</i>	<i>expression</i>	<i>type</i>
x	int	p	
&x	int *	*p	
y + x		p->next	
x + 1		p->data	
&y		*(p->next)	
b		head	
*a		head->next->next	
&a		head->next->data	
n		argv[0]	
&n		argc	

- (b) (10 pts) Draw a picture of the linked list that is constructed by this program, and is in memory at the time the `return(0);` statement is reached. In your picture, indicate where `head`, `tail`, and `p` are pointing. If you need more space, draw your picture next to the code on the following page.

- (c) (6 pts) For each of the following, circle whether the item indicated can be found on the stack or the heap (as of the time that the `return 0;` is reached.)

x	stack	heap
b	stack	heap
*a	stack	heap
n	stack	heap
head	stack	heap
*head	stack	heap

```
// E02_181S04_p1.cc
// Example program for CISC181 Midterm Exam 2
// P. Conrad, Spring 2004

#include <iostream>

struct Node
{
    int data;
    Node *next;
};

int main(int argc, char *argv[])
{
    int x;
    double y;
    int z;
    int *a;
    double *b;

    Node n;
    n.data = 12;
    n.next = NULL;

    x = 3;
    y = 7.3;
    z = 8;
    a = &z;
    b = &y;

    Node *head = NULL;
    Node *tail = NULL;
    Node *p = NULL;

    head = new Node;
    head->data = 3;
    head->next = NULL;
    tail = head;

    p = new Node;
    p->data = 6;
    p->next = NULL;
    tail -> next = p;
    tail = p;

    p = new Node;
    p->data = 10;
    p->next = NULL;
    tail -> next = p;
    tail = p;

    return 0;
} // end main
```

Classes

2. The following declaration for the class `SetOfIntegers` is incomplete. Add the following items:
 - (a) (4 pts) The function prototype for a constructor for this class that takes no arguments.
 - (b) (4 pts) The function prototype for a constructor for this class that takes one integer argument called `initialElement`, which will represent an element that should be added to the set as it is created.
 - (c) (4 pts) The function prototype for a destructor for this class.
 - (d) (4 pts) Private data members (integers) called `size` and `maxSize`.

```
class SetOfIntegers
{
    public:

        bool isEmpty();
        bool isMemberOfSet(int x);
        void add(int x);
        void remove(int x);

    private:
        int *array;

};
```

3. (2 pts) What file would the class declaration above typically be stored in? (give the filename)
4. (4 pts) Now, write the body of the member function `isEmpty`, as it would appear in the file called `SetOfIntegers.cpp`. The function should return `true` if `size` is equal to 0, and `false` if `size` is not equal to zero.

5. This question still refers back to the `SetOfIntegers` class on the previous page. Below, there is a main program that is incomplete. Add the following:

- (a) (3 pts) A variable declaration that creates an instance of the class `SetOfIntegers` called `s`.
- (b) (3 pts) A condition inside the if test that calls the member function `isEmpty` to check if the `SetOfIntegers s` is empty.

```
// main program for SetOfInteger class question on Midterm 2
#include <iostream>
using std::cout;
using std::endl;

#include "SetOfInteger.h"

int main(void)
{
    // add variable declaration for s after this comment

    // fill in the condition of the if test after this comment

    if (
        )
    {
        cout << "The set is empty" << endl;
    }

    return 0;
}
```

Editor Commands

6. Circle either `vi` or `emacs`, to indicate which editor you prefer. Your choice will determine the correct answer to the question(s) in this section.

`vi` `emacs`

7. (2 pts) Suppose you are editing a very large C++ program and you want to search for the variable `count`. What sequence of keys do you press?

8. (2 pts) What is the “undo” keystroke in your editor?

Unix Commands

9. (3 pts) What Unix shell command do you type to run the program called `foo` and redirect its standard output into a file called `bar`?

10. (3 pts) What is the command (or sequence of commands) you must issue to make all the files under your `public_html` directory readable on the web? (Assume that your current working directory is NOT your home directory.)

11. (8 pts) Assume that the following directory contains a collection of C++ files and text files:

```
~pconrad/public_html/cisc181/lab05
```

Assume that you start at the shell prompt, and your current working directory is your home directory.

Type a command, or sequence of commands, so that when you are finished:

- there is a subdirectory of your home directory called `cisc181`,
- there is a subdirectory under `cisc181` called `lab05`
- your newly created `lab05` directory ends up containing a copy of every file from `pconrad`'s version of the `lab05` directory.
- the newly created directory `lab05` is your new working directory.

15. Number conversions:

(a) (3 pts) Convert ABBA1975 from hexadecimal to binary

(b) (3 pts) Convert 10011001 from binary to decimal

(c) (3 pts) Convert 111101010110101 from binary to hexadecimal.

Total Points: 100