

Name _____

Section (circle one, (2 pts)): 010 011 012
013 014 015**Instructions (for practice questions)**

These are sample questions from previous exams as well as some new questions of the type you might see on your next midterm. We might not have covered all this material yet, but I intend to cover all of it before the next exam date. (Whatever we don't cover won't be on the exam.)

These are not the ONLY questions to expect

These exam questions are provided to help you study and practice. However, they are not necessarily the ONLY things you need to know, or the ONLY type of questions I might ask. You *still* need to study your lecture notes, the textbooks, and the labs, homeworks and projects to prepare for other types of questions that might appear.

Timing, Point Values, Exam Length

This set of practice questions is longer than what you would see on an actual exam. An actual exam would sum to 100 points.

I assign point values with time in mind. You should be able to answer each question in $< p/2$ minutes, where p is the point value, e.g., a 10 point question should take you < 5 minutes; a 1 point question should take you < 30 seconds.) That way, you can complete a 100 point exam in ≤ 50 minutes.

General Instructions...

...as they would appear on an actual midterm exam.

- 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?

9. (4 pts) Suppose you realize that you have accidentally spelled an important variable in your program two different ways: `totPrice` and `totalPrice`. Your TA suggests that “`totalPrice`” is a better name, so you want to change every occurrence of `totPrice` to `totalPrice`.

However, `totPrice` occurs many times, and it would be very tedious to find every occurrence by hand and retype it.

Describe how to do “global search and replace” to replace every occurrence of `totPrice` with `totalPrice`.

Unix Commands

10. (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`?

11. (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.)

12. (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.

HTML and the Web

13. (10 pts) It's a year in the future, and you are taking CISC321. Your current working directory, `~/cisc321/lab05` contains files `results.dat`, and `results.png`. You are instructed to make these files available on a web page called `http://udel.edu/~userid/cisc321/lab05`. That web page should consist of only a directory listing of the files, available for download. Don't assume that any of the necessary directories already exist. You need to create *all* of them.

List the complete sequence of commands you need to type to accomplish this.

Hints: (which you might not get if this were a real exam!)

- You don't need to do any HTML coding.
- You need a command to make the necessary directories. In this example, three directories need to be created.
- You need a command to move the files.
- You need a command to make the files readable on the web.

14. HTML includes something called “elements” and “tags”.

- (4 pts) Write an example of of a complete “element” in HTML, that includes both an open tag and a close tag.

- (1 pts) Underline the close tag. Don’t underline anything else except the close tag.

- (2 pts) Explain how a browser is supposed to interpret the element that you gave as an answer above. (What would does the browser do differently because the text in the element is tagged? Does it look different? Behave differently?)

An accurate one-sentence explanation is enough. Don’t write a book.

HTML and the Web: Multiple Choice

15. (2 pts) Suppose a UD student named Terry Bly Smart has the userid tbsmart. Which of the following URLs brings up his/her personal web page on strauss?

(Note: The prefixes `http://udel.edu`, `http://copland.udel.edu` and `strauss.udel.edu` all point to the same set of web pages, so don't worry about that part of the answer.)

- (a) `http://strauss.udel.edu/tbsmart`
 - (b) `http://strauss.udel.edu/~tbsmart`
 - (c) `http://strauss.udel.edu/~tbsmart/public_html`
 - (d) `http://strauss.udel.edu/~tbsmart/public.html`
16. (2 pts) Your CISC181 web page has the URL `http://udel.edu/~userid/cisc181`. Which of the following files controls the content of that page?

- (a) `~/cisc181/index.html`
- (b) `/public_html/index.html`
- (c) `~/public_html/index.html`
- (d) `/public_html/cisc181/index.html`
- (e) `~/public_html/cisc181/index.html`

17. (2 pts) Your CISC181 web page has the URL `http://udel.edu/~userid/cisc181`. Which of the following files controls the content of that page?

- (a) `~/cisc181/index.html`
- (b) `/public_html/index.html`
- (c) `~/public_html/index.html`
- (d) `/public_html/cisc181/index.html`
- (e) `~/public_html/cisc181/index.html`

18. (2 pts) Suppose in a future semester, your instructor for CISC321 requires you to create a web page on strauss with the URL `http://strauss.udel.edu/~userid/CISC321`. Which of the following is a true statement?

(Note: The prefixes `http://udel.edu`, `http://copland.udel.edu` and `strauss.udel.edu` all point to the same set of web pages, so don't worry about that part of the answer.)

- (a) You must edit the file `~/public_html/cisc321/index.html` to create that web page.
- (b) You may edit either the file `~/public_html/CISC321/index.htm` or the file `~/public_html/CISC321/index.html` to create that web page; the web server will recognize either `.htm` or `.html` as valid extensions.
- (c) You must edit the file `~/public_html/CISC321/index.html` to create that web page.
- (d) You may edit the file `~/public_html/CISC321/index.html` to create that web page, or you may edit the file `~/public_html/cisc321/index.html` to create that web page, because uppercase vs. lowercase doesn't matter for names of web pages.

Short Answer

19. (2 pts) What is the “binary scope resolution operator”

20. The C++ language includes something called “pre-processor directives”.

- (2 pts) Write a *complete line of C++* that uses a pre-processor directive.

- (2 pts) Explain *what* the pre-processor does to carry out that directive.

An accurate one-sentence explanation is enough. Don't write a book.

- (2 pts) Explain *why* a programmer might write that line of code.

An accurate one-sentence explanation is enough. Don't write a book.

21. Sometimes, but not always, it is important for the programmer to write a destructor for a class.

(a) (2 pts) Under what circumstances is this crucial?

(b) (2 pts) What “bad thing” might happen if the programmer neglects this responsibility? (Don’t just say “the program won’t work”, or “the program will crash”. I need a more specific answer than that.)

Number conversions

22. (3 pts) Convert ABBA1975 from hexadecimal to binary

23. (3 pts) Convert 10011001 from binary to decimal

24. (3 pts) Convert 1111101010110101 from binary to hexadecimal.

Multiple Choice

25. (2 pts) Which of the following tests whether x is odd?
- (a) `if (x % 2 = 0)` (b) `if (x % 2 == 0)` (c) `if (x % 2 = 1)`
(d) `if (x % 2 == 1)` (e) `if (x % 2 != 0)`
26. (2 pts) How many operands does a ternary operator have
(a) none (b) one (c) two (d) three
27. (2 pts) How many operands does a unary operator have
(a) none (b) one (c) two (d) three
28. (2 pts) Which of the following is *both* a logical operator and a unary operator?
(a) `||` (b) `&&` (c) `++` (d) `!`
29. (2 pts) Each of the relational operators in C++ also happens to be this kind of operator:
(a) unary (b) binary (c) ternary (d) assignment
30. (2 pts) Which of the following C++ types uses an internal representation with a mantissa, exponent, base, and sign?
(a) char (b) double (c) int (d) bool
31. (2 pts) Which of the following C++ types uses ASCII codes to determine the internal representation?
(a) char (b) double (c) int (d) bool

32. (2 pts) If you had the following line of code in a C++ program:

```
ifstream teamFile("teams.txt", ios::in);
```

then which of the following is a *correct* line of code you might expect to find later in that same program?

- (a) `ifstream << x;`
- (b) `teamFile << x;`
- (c) `teamFile >> x;`
- (d) `teams.txt << x;`
- (e) `teams.txt >> x;`

33. (2 pts) If you had the following line of code in a C++ program:

```
ofstream studentFile("students.dat", ios::out);
```

then which of the following is a *correct* line of code you might expect to find later in that same program?

- (a) `ofstream << x;`
- (b) `studentFile << x;`
- (c) `studentFile >> x;`
- (d) `students.dat << x;`
- (e) `students.dat >> x;`

34. (2 pts) Which of the following tests whether x is equal to 10?

(a) `if (x == 10)` (b) `if (x = 10)` (c) `if (x?10:0)`

35. (2 pts) Which expression means the *opposite* of $x < 0$

(a) `x > 0` (b) `x >= 0` (c) `x == 0`

36. (2 pts) Given the number 11111 in binary, what is the equivalent in decimal?

(a) 15 (b) 16 (c) 21 (d) 31 (e) 32

37. (2 pts) Given the number 11111111 in binary, what is the equivalent in octal?

(a) 777 (b) 377 (c) 773 (d) 333 (e) 8

38. (2 pts) Which of the following assigns the value of 2 times y to x?

(a) `x == 2 * x;` (b) `2 * y = x;` (c) `x = 2 x y;` (d) `x = 2 * y;`

39. (2 pts) In the expression 1111000×2^{10010} , which part is the mantissa?

(a) 1111000 (b) \times (c) 2 (d) 10010

40. (2 pts) In the expression 1111000×2^{10010} , which part is the base?

(a) 1111000 (b) \times (c) 2 (d) 10010

41. (2 pts) In the expression 1111000×2^{10010} , which part is the exponent?

(a) 1111000 (b) \times (c) 2 (d) 10010

42. (2 pts) The C++ statement `x = x / 2;` is equivalent to which of the following statements?

(a) `x /= 2;` (b) `x += 2;` (c) `x = 2;` (d) `x = 2 / x ;`

43. (2 pts) The C++ expression `(25 % 8)` evaluates to which of the following:

(a) 0 (b) 1 (c) 2 (d) 3 (e) 4

44. (2 pts) The C++ expression `(4 % 50)` evaluates to which of the following:

(a) 0 (b) 2 (c) 4 (d) 12 (e) 50

45. (2 pts) The C++ expression `(50 / 4)` evaluates to which of the following:

(a) 12 (b) 12.5 (c) 13 (d) 50

Total Points: 176