Please circle your section number:

010 (Mon 09:05) 013 (Wed 09:05)
011 (Mon 10:10) 014 (Wed 10:10)
012 (Mon 11:15) 015 (Wed 11:15)

Answer the multiple choice questions on a “Scantron Form”
Bubble in ONLY your Unix userid and your answers
DO NOT bubble in your id number or section
If you bubble in your SSN, the computer will reject your form!!!

Answer the remaining questions directly on the exam paper.

General Instructions

• The exam is 50% multiple choice, and 50% programming.

• The programming questions start with number 23. You may want to tackle them first, since they may take more time.

• DO NOT WRITE YOUR NAME ON ANY PAGE EXCEPT THIS ONE!

• You have 50 minutes. Pace yourself, and pay attention to the point values.

• Read all the directions carefully on each problem.

• Good luck.
Questions 1 through 3 deal with the code for `p01.cc` on page 15.

1. **(2 pts)** The symbol `*` on line 18 of program `p01.cc` indicates:
   - (a) multiplication
   - (b) address of
   - (c) dereference
   - (d) assignment

2. **(2 pts)** The symbol `&` on line 11 of `p01.cc` means
   - (a) true C++ style pass by reference
   - (b) take the address of a
   - (c) logical and
   - (d) bitwise and

3. **(2 pts)** The function `fun` in `p01.cc` illustrates:
   - (a) simulated, or “C-style” pass by reference (pass by pointer)
   - (b) true (C++ style) pass by reference
   - (c) pass by value

4. **(2 pts)** The output of `p01.cc` will be
   - (a) `(*w)=2
     a=2`
   - (b) `(*w)=7
     a=7`
   - (c) `(*w)=2
     a=7`
   - (d) `(*w)=14
     a=2`
   - (e) `(*w)=14
     a=14`
Questions 7 through 6 deal with number conversions.

5. **(3 pts)** Convert 187 from decimal to binary
   - (a) 0001 0111
   - (b) 0110 0111
   - (c) 1011 1011
   - (d) 0001 1011
   - (e) 0111 0111

6. **(3 pts)** Convert 56 from octal to decimal
   - (a) 46
   - (b) 11
   - (c) 101 110
   - (d) 0101 0110
   - (e) 56

7. **(3 pts)** Convert 01011101 from base 2 to base 16
   - (a) 513
   - (b) 5C
   - (c) 5D
   - (d) 93
   - (e) 512
Questions 8 through 13 deal with the code for p02.cc on page 15.

8. (2 pts) Lines 16–20 of the program p02.cc contain which of the following?
   (a) a function prototype
   (b) a function definition
   (c) a function call
   (d) a pre-processor directive

9. (2 pts) Line 6 of the program p02.cc contains which of the following?
   (a) a function prototype
   (b) a function definition
   (c) a function call
   (d) a pre-processor directive

10. (2 pts) The variable y in p02.cc is
    (a) a formal parameter
    (b) an actual parameter

11. (2 pts) The function times in p01.cc illustrates:
    (a) simulated, or “C-style” pass by reference (pass by pointer)
    (b) true (C++ style) pass by reference
    (c) pass by value

12. (2 pts) The symbol * on line 18 of program p02.cc indicates:
    (a) multiplication
    (b) address of
    (c) dereference
    (d) assignment

13. (2 pts) The output of p02.cc will be
    (a) y=9
       b=7
    (b) y=7
       b=9
    (c) b=7
       y=63
    (d) b=63
       y=63
    (e) y=63
       b=7
Questions 14 through 15 involve comparing p02.cc on page 15 with p03.cc on page 16.

14. (2 pts) Suppose line 11 of p02.cc were replaced with:

```
times(b-3);
```

What would be the result if you tried to compile and run?

(a) \( y=36 \\
    b=7 \)
(b) \( y=36 \\
    b=4 \)
(c) \( y=7 \\
    b=36 \)
(d) \( b=7 \\
    y=36 \)
(e) You’d get a syntax error, because you can’t pass \( b-3 \) to \texttt{times}. 

15. (2 pts) Suppose line 11 of p03.cc were replaced with:

```
phooey(b+2);
```

What would be the result if you tried to compile and run?

(a) \( z=2 \\
    b=3 \)
(b) \( z=2.5 \\
    b=5 \)
(c) \( b=3 \\
    z=2 \)
(d) \( z=3 \\
    b=3 \)
(e) You’d get a syntax error, because you can’t pass \( b+2 \) to phooey.
Questions 16 through 20 deal with the code for p03.cc on page 16.

16. (1 pts) Lines 8–14 of the program p03.cc contain which of the following?
   (a) a function prototype
   (b) a function definition (for main)
   (c) a function call
   (d) a pre-processor directive

17. (2 pts) The variable b in p03.cc is
   (a) a formal parameter
   (b) an actual parameter

18. (2 pts) The variable b in p03.cc is
   (a) passed by value
   (b) passed by reference

19. (2 pts) The symbol & on line 16 of p03.cc indicates which of the following:
   (a) take the address of z
   (b) that the type of z is int *
   (c) that true pass-by-reference is used for parameter z
   (d) that both int and z are parameters of phooey

20. (2 pts) The output of p03.cc will be
   (a) z=1.5
       b=1
   (b) z=1
       b=1
   (c) z=2
       b=1
   (d) b=3
       z=2
   (e) z=3
       b=3
21. (4 pts) Which of the following lines of code contains the stream insertion operator?

(a) cin >> x;
(b) cout << x;
(c) using std::cin;
(d) stream.insert();
(e) stream::insert();

22. (4 pts) Which of the following correctly accumulates the sum of the values from an input file?

(a) // *** Accumulate sum ***
   int x;
   int sum=0;
   
   while (!infile.eof()) // while not end of file
   {
      infile >> x;
      sum += x;
   }

(b) // *** Accumulate sum ***
   int x;
   int sum=0;
   
   infile >> x;
   while (!infile.eof()) // while not end of file
   {
      sum += x;
      infile >> x;
   }

(c) // *** Accumulate sum ***
   int x;
   int sum=0;
   
   while (!infile.eof()) // while not end of file
   {
      infile >> x;
      x += sum;
   }
Section 2. Short Answer (answer on this sheet)

23. (30 pts) Write a complete C++ program to solve the problem outlined on page 16. Be sure to include:

- an opening comment (don’t put your name in the comment! -2 pts if you do!)
- all necessary “stuff” that goes before the main program
- a full main program complete with comments
Space for your answer.
There is more space on the next two pages in case you need it.
Extra space in case you need it
Extra space in case you need it
24. (20 pts) In lab3, you wrote a function called “outlineBox” that took three parameters, and produced boxes such as the following:

The function `drawZ` in the program listed below should operate in a similar manner.

The function should draw a picture on standard output in the shape of the plus sign of the given width, followed by a blank line. The height will always be equal to the width. Example output is on the next page.

Restriction:

- Width must be greater than or equal to 3. If this conditions is not met the function should just return without printing anything. No error message should be produced.

Sample output appears below.

The complete program appears on the next page (with the body of function `drawZ` omitted), with sample output on the following page. You may fill in the function in the space provided, or rewrite the complete function in the blank space (beside or below the sample output.)

There is also a `helper()` function that you may use to factor out duplicate code; you are not required to do this, but it will save you time if you do.

```
stimpy[3:17am]> ./drawZ
aaaaa
   a
   a
aaaaa
bbbbbbb
   b
   b
   b
bbbbbbb
cccc
   c
   c
cccc
   eee
   e
   eee
stimpy[3:17am]>
```
// drawZ.cc Exam question for CISC181
// P. Conrad, 10/12/05

#include <iostream>
using namespace std;

void helper(int width, char c)
{
}

void drawZ(int width, char c)
{
}

int main(void)
{
  drawZ(5,'a');
  drawZ(7,'b');
  drawZ(4,'c');
  drawZ(1,'d');
  drawZ(3,'e');
  return 0;
}
End of Exam. Total Points: 100 2DKB37TP182D61F3SQXAPE38A
Code Excerpts referred to in Exam Questions

```cpp
// p01.cc  CISC181 Exam
#include <iostream>
using namespace std;

void fun(int *w);

int main(void)
{
    int a = 2;
    fun(&a);
    cout << "a=" << a << endl;
    return 0;
}

void fun(int *w)
{
    (*w) = 7;
    cout << "(*w)=" << (*w) << endl;
}
```

```cpp
// p02.cc  CISC181 Exam
#include <iostream>
using namespace std;

void times(int y);

int main(void)
{
    int b = 7;
    times(b);
    cout << "b=" << b << endl;
    return 0;
}

void times(int y)
{
    y = y * 9;
    cout << "y=" << y << endl;
}
```
Problem Statement for Question 23: Ask the user of the program to input three integers. Determine whether the largest of the three numbers is the product of the other two. For example:

- For input of 10 2 5, the program would print:

  10 is the product of 2 and 5.

- For input of 5 17 3, the program would print:

  17 is not the product of 5 and 3.

- The numbers other than the largest may be in any arbitrary order— it is equally acceptable if the output for 5 17 3 is:

  17 is not the product of 3 and 5.

- Check for one error condition: the three numbers must all be different. If any of the numbers is equal to either of the two others, print an error message and end the program immediately. For example, for input of 3 1 3, print:

  Sorry: the numbers must all be different.

- Your program should provide appropriate prompts to the user, and should also label the output appropriately and neatly.
1. (c)
2. (b)
3. (a)
4. (b)
5. (c)
6. (a)
7. (c)
8. (b)
9. (a)
10. (a)
11. (c)
12. (a)
13. (e)
14. (a)
15. (e)
16. (b)
17. (b)
18. (b)
19. (c)
20. (b)
21. (b)Lecture notes 02/08/06
22. (b)Lecture notes 02/13/06
#include <iostream>
using namespace std;

int main(void)
{
    int num1, num2;
    int smaller, larger;
    // prompt user for input
    cout << "Enter an integer : ";
    cin >> num1;
    cout << "Enter another integer: ";
    cin >> num2;
    // check for error condition
    if (num1 < 0 || num2 < 0)
    {
        cerr << "Neither number may be negative" << endl;
        exit(1);
    }
    // determine which is larger
    if (num1 <= num2)
    {
        smaller = num1; larger = num2;
    }
    else
    {
        smaller = num2; larger = num1;
    }
    // produce output
    cout << larger << " is ";
    cout << ( (smaller * smaller == larger) ? "" : "not " );
    cout << "the square of " << smaller << endl;
    return 0;
}
```cpp
// drawZ.cc Exam question for CISC181
// P. Conrad, 10/12/05

#include <iostream>
using namespace std;

void helper(int width, char c)
{
    // this function draws part of the Z
    // and is called more than once from inside drawZ
    int i;
    for (i = 0; i < width; i++)
    {
        cout << c ;
    }
    cout << endl;
}

void drawZ(int width, char c)
{
    // ****
    // * i starts at width-2, counts down to 1
    // *
    // ****
    if (width < 3) // if width is less than 3
        return;
    int i,j;
    helper(width, c); // draw top of Z
    // nested loop for cross bar
    for (i = width-2; i>0; i--) // count down to 1
    {
        for (j = 0; j < i; j++) // i spaces
            cout << ' ';
        cout << c << endl;
    }
    helper(width, c); // draw bottom of Z
    return;
}

int main(void)
{
    drawZ(5,'a');
    drawZ(7,'b');
    drawZ(4,'c');
    drawZ(1,'d');
    drawZ(3,'e');
    return 0;
}
```

End of Key, version A  Total Points: 0
Please circle your section number:

010 (Mon 09:05)  013 (Wed 09:05)
011 (Mon 10:10)  014 (Wed 10:10)
012 (Mon 11:15)  015 (Wed 11:15)

Answer the multiple choice questions on a “Scantron Form”
Bubble in ONLY your Unix userid and your answers
DO NOT bubble in your id number or section
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General Instructions

• The exam is 50% multiple choice, and 50% programming.
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• DO NOT WRITE YOUR NAME ON ANY PAGE EXCEPT THIS ONE!
• You have 50 minutes. Pace yourself, and pay attention to the point values.
• Read all the directions carefully on each problem.
• Good luck.
Questions 1 through 3 deal with the code for p01.cc on page 15.

1. (2 pts) The symbol * on line 18 of program p01.cc indicates:
   (a) multiplication
   (b) address of
   (c) dereference
   (d) assignment

2. (2 pts) The symbol & on line 11 of p01.cc means
   (a) true C++ style pass by reference
   (b) take the address of a
   (c) logical and
   (d) bitwise and

3. (2 pts) The function fun in p01.cc illustrates:
   (a) simulated, or “C-style” pass by reference (pass by pointer)
   (b) true (C++ style) pass by reference
   (c) pass by value

4. (2 pts) The output of p01.cc will be
   (a) (w) = 2
      a = 2
   (b) (w) = 7
      a = 7
   (c) (w) = 2
      a = 7
   (d) (w) = 14
      a = 2
   (e) (w) = 14
      a = 14
Questions 5 through 6 involve comparing `p02.cc` on page 15 with `p03.cc` on page 16.

5. (2 pts) Suppose line 11 of `p02.cc` were replaced with:

```c
  times(b-3);
```

What would be the result if you tried to compile and run?

(a) \( y=36 \quad b=7 \)
(b) \( y=36 \quad b=4 \)
(c) \( y=7 \quad b=36 \)
(d) \( b=7 \quad y=36 \)
(e) You’d get a syntax error, because you can’t pass \((b-3)\) to `times`.

6. (2 pts) Suppose line 11 of `p03.cc` were replaced with:

```c
  phooey(b+2);
```

What would be the result if you tried to compile and run?

(a) \( z=2 \quad b=3 \)
(b) \( z=2.5 \quad b=5 \)
(c) \( b=3 \quad z=2 \)
(d) \( z=3 \quad b=3 \)
(e) You’d get a syntax error, because you can’t pass \((b+2)\) to `phooey`. 
Questions 7 through 12 deal with the code for \texttt{p02.cc} on page 15.

7. (2 pts) Lines 16–20 of the program \texttt{p02.cc} contain which of the following?
   (a) a function prototype
   (b) a function definition
   (c) a function call
   (d) a pre-processor directive

8. (2 pts) Line 6 of the program \texttt{p02.cc} contains which of the following?
   (a) a function prototype
   (b) a function definition
   (c) a function call
   (d) a pre-processor directive

9. (2 pts) The variable \texttt{y} in \texttt{p02.cc} is
   (a) a formal parameter
   (b) an actual parameter

10. (2 pts) The function \texttt{times} in \texttt{p01.cc} illustrates:
    (a) simulated, or “C-style” pass by reference (pass by pointer)
    (b) true (C++ style) pass by reference
    (c) pass by value

11. (2 pts) The symbol * on line 18 of program \texttt{p02.cc} indicates:
    (a) multiplication
    (b) address of
    (c) dereference
    (d) assignment

12. (2 pts) The output of \texttt{p02.cc} will be
    (a) \texttt{y=9 b=7}
    (b) \texttt{y=7 b=9}
    (c) \texttt{b=7 y=63}
    (d) \texttt{b=63 y=63}
    (e) \texttt{y=63 b=7}
13. (4 pts) Which of the following lines of code contains the stream insertion operator?

(a) cin >> x;
(b) cout << x;
(c) using std::cin;
(d) stream.insert();
(e) stream::insert();

14. (4 pts) Which of the following correctly accumulates the sum of the values from an input file?

(a) // *** Accumulate sum ***
   int x;
   int sum=0;

   while (!infile.eof()) // while not end of file
   {
     infile >> x;
     sum += x;
   }

(b) // *** Accumulate sum ***
   int x;
   int sum=0;

   infile >> x;
   while (!infile.eof()) // while not end of file
   {
     sum += x;
     infile >> x;
   }

(c) // *** Accumulate sum ***
   int x;
   int sum=0;

   while (!infile.eof()) // while not end of file
   {
     infile >> x;
     x += sum;
   }

   sum += x;
   }
Questions 17 through 16 deal with number conversions.

15. **(3 pts)** Convert 187 from decimal to binary
   
   (a) 0001 0111
   (b) 0110 0111
   (c) 1011 1011
   (d) 0001 1011
   (e) 0111 0111

16. **(3 pts)** Convert 56 from octal to decimal
   
   (a) 46
   (b) 11
   (c) 101 110
   (d) 0101 0110
   (e) 56

17. **(3 pts)** Convert 01011101 from base 2 to base 16
   
   (a) 513
   (b) 5C
   (c) 5D
   (d) 93
   (e) 512
Questions 18 through 22 deal with the code for `p03.cc` on page 16.

18. (1 pts) Lines 8–14 of the program `p03.cc` contain which of the following?
   (a) a function prototype
   (b) a function definition (for main)
   (c) a function call
   (d) a pre-processor directive

19. (2 pts) The variable `b` in `p03.cc` is
   (a) a formal parameter
   (b) an actual parameter

20. (2 pts) The variable `b` in `p03.cc` is
   (a) passed by value
   (b) passed by reference

21. (2 pts) The symbol `&` on line 16 of `p03.cc` indicates which of the following:
   (a) take the *address* of `z`
   (b) that the *type* of `z` is `int *`
   (c) that true *pass-by-reference* is used for parameter `z`
   (d) that both `int` and `z` are parameters of `phooey`

22. (2 pts) The output of `p03.cc` will be
   (a) `z=1.5
     b=1`
   (b) `z=1
     b=1`
   (c) `z=2
     b=1`
   (d) `b=3
     z=2`
   (e) `z=3
     b=3`
23. (30 pts) Write a complete C++ program to solve the problem outlined on page 16. Be sure to include:

- an opening comment (\textit{don’t} put your name in the comment! -2 pts if you do!)
- all necessary “stuff” that goes before the main program
- a full main program complete with comments
Space for your answer.
There is more space on the next two pages in case you need it.
Extra space in case you need it
Extra space in case you need it
24. (20 pts) In lab3, you wrote a function called “outlineBox” that took three parameters, and produced boxes such as the following:

The function `drawZ` in the program listed below should operate in a similar manner.

The function should draw a picture on standard output in the shape of the plus sign of the given width, followed by a blank line. The height will always be equal to the width. Example output is on the next page.

Restriction:

- Width must be greater than or equal to 3. If this condition is not met the function should just return without printing anything. No error message should be produced.

Sample output appears below.

The complete program appears on the next page (with the body of function `drawZ` omitted), with sample output on the following page. You may fill in the function in the space provided, or rewrite the complete function in the blank space (beside or below the sample output.)

There is also a `helper()` function that you may use to factor out duplicate code; you are not required to do this, but it will save you time if you do.

```
stimpy[3:17am]> ./drawZ
aaaaa
  a
  a
aaaaa
bbbbbbb
    b
    b
    b
    b
bbbbbbb
cccc
  c
  c
cccc
eee
  e
  eee
stimpy[3:17am]>
```
```cpp
#include <iostream>
using namespace std;

void helper(int width, char c) {
    // drawZ.cc Exam question for CISC181
    // P. Conrad, 10/12/05

    void drawZ(int width, char c) {
        // helper(int width, char c)
        // drawZ(int width, char c)
        // main(void)
        // drawZ(5,'a');
        // drawZ(7,'b');
        // drawZ(4,'c');
        // drawZ(1,'d');
        // drawZ(3,'e');
        // return 0;
    }

    int main(void) {
        drawZ(5,'a');
        drawZ(7,'b');
        drawZ(4,'c');
        drawZ(1,'d');
        drawZ(3,'e');
        return 0;
    }
}
```
End of Exam. Total Points: 100 2 D K B 3 7 H P 1 8 2 D 6 S F 3 T Q X B P E 3 8 B
Code Excerpts referred to in Exam Questions

```cpp
// p01.cc  CISC181 Exam
#include <iostream>
using namespace std;

void fun(int *w);

int main(void) {
    int a = 2;
    fun(&a);
    cout << "a=" << a << endl;
    return 0;
}

void fun(int *w) {
    (*w) = 7;
    cout << "(*w)=" << (*w) << endl;
}
```

```cpp
// p02.cc  CISC181 Exam
#include <iostream>
using namespace std;

void times(int y);

int main(void) {
    int b = 7;
    times(b);
    cout << "b=" << b << endl;
    return 0;
}

void times(int y) {
    y = y * 9;
    cout << "y=" << y << endl;
}
```
Problem Statement for Question 23: Ask the user of the program to input three integers. Determine whether the largest of the three numbers is the product of the other two. For example:

- For input of 10 2 5, the program would print:
  
  10 is the product of 2 and 5.

- For input of 5 17 3, the program would print:

  17 is not the product of 5 and 3.

- The numbers other than the largest may be in any arbitrary order— it is equally acceptable if the output for 5 17 3 is:

  17 is not the product of 3 and 5.

- Check for one error condition: the three numbers must all be different. If any of the numbers is equal to either of the two others, print an error message and end the program immediately. For example, for input of 3 1 3, print:

  Sorry: the numbers must all be different.

- Your program should provide appropriate prompts to the user, and should also label the output appropriately and neatly.
1. (c)
2. (b)
3. (a)
4. (b)
5. (a)
6. (e)
7. (b)
8. (a)
9. (a)
10. (c)
11. (a)
12. (e)
13. (b) Lecture notes 02/08/06
14. (b) Lecture notes 02/13/06
15. (c)
16. (a)
17. (c)
18. (b)
19. (b)
20. (b)
21. (c)
22. (b)
// e01question.cc  P. Conrad  Fall 2005
// is the larger square of the smaller?

#include <iostream>
using namespace std;

int main(void)
{
    int num1, num2;
    int smaller, larger;

    // prompt user for input
    cout << "Enter an integer : ";
    cin >> num1;
    cout << "Enter another integer: ";
    cin >> num2;

    // check for error condition
    if (num1 < 0 || num2 < 0)
    {
        cerr << "Neither number may be negative" << endl;
        exit(1);
    }

    // determine which is larger
    if (num1 <= num2)
    {
        smaller = num1; larger = num2;
    }
    else
    {
        smaller = num2; larger = num1;
    }

    // produce output
    cout << larger << " is ";
    cout << ( (smaller * smaller == larger) ? "" : "not ");
    cout << "the square of " << smaller << endl;

    return 0;
}
// drawZ.cc Exam question for CISC181
// P. Conrad, 10/12/05

#include <iostream>
using namespace std;

void helper(int width, char c)
{
    // this function draws part of the Z
    // and is called more than once from inside drawZ
    int i;
    for (i = 0; i < width; i++)
        { cout << c ;
        } cout << endl;
}

// ****
// * i starts at width-2, counts down to 1
// *
// ****

void drawZ(int width, char c)
{
    if (width < 3) // if width is less than 3
        return;
    int i, j;

    helper(width, c); // draw top of Z

    // nested loop for cross bar
    for (i = width-2; i>0; i--) // count down to 1
        { for (j = 0; j < i; j++) // i spaces
            { cout << ' ';
            } cout << c << endl;
        } helper(width, c); // draw bottom of Z

    return;
}

int main(void)
{
    drawZ(5,'a');
    drawZ(7,'b');
    drawZ(4,'c');
    drawZ(1,'d');
    drawZ(3,'e');
    return 0;
}
Please circle your section number:

010 (Mon 09:05) 013 (Wed 09:05)
011 (Mon 10:10) 014 (Wed 10:10)
012 (Mon 11:15) 015 (Wed 11:15)

Answer the multiple choice questions on a “Scantron Form”

Bubble in ONLY your Unix userid and your answers

DO NOT bubble in your id number or section
If you bubble in your SSN, the computer will **reject your form!!!**

Answer the remaining questions directly on the exam paper.

**General Instructions**

- The exam is 50% multiple choice, and 50% programming.
- The programming questions start with number 23. You may want to tackle them first, since they may take more time.
- **DO NOT WRITE YOUR NAME ON ANY PAGE EXCEPT THIS ONE!**
- You have 50 minutes. **Pace yourself,** and pay attention to the point values.
- Read *all* the directions *carefully* on each problem.
- Good luck.
1. (4 pts) Which of the following lines of code contains the stream insertion operator?
   (a) `cin >> x;`
   (b) `cout << x;`
   (c) `using std::cin;`
   (d) `stream.insert();`
   (e) `stream::insert();`

2. (4 pts) Which of the following correctly accumulates the sum of the values from an input file?
   (a) ```
   // *** Accumulate sum ***
   int x;
   int sum=0;
   
   while (!infile.eof()) // while not end of file
   {
       infile >> x;
       sum += x;
   }
   ```
   (b) ```
   // *** Accumulate sum ***
   int x;
   int sum=0;
   
   infile >> x;
   while (!infile.eof()) // while not end of file
   {
       sum += x;
       infile >> x;
   }
   ```
   (c) ```
   // *** Accumulate sum ***
   int x;
   int sum=0;
   
   while (!infile.eof()) // while not end of file
   {
       infile >> x;
       x += sum;
   }```
Questions 3 through 5 deal with the code for p01.cc on page 15.

3. (2 pts) The symbol * on line 18 of program p01.cc indicates:
   (a) multiplication
   (b) address of
   (c) dereference
   (d) assignment

4. (2 pts) The symbol & on line 11 of p01.cc means
   (a) true C++ style pass by reference
   (b) take the address of a
   (c) logical and
   (d) bitwise and

5. (2 pts) The function fun in p01.cc illustrates:
   (a) simulated, or “C-style” pass by reference (pass by pointer)
   (b) true (C++ style) pass by reference
   (c) pass by value

6. (2 pts) The output of p01.cc will be
   (a) \((w) = 2\\n       a = 2\)
   (b) \((w) = 7\\n       a = 7\)
   (c) \((w) = 2\\n       a = 7\)
   (d) \((w) = 14\\n       a = 2\)
   (e) \((w) = 14\\n       a = 14\)
Questions 7 through 11 deal with the code for p03.cc on page 16.

7. (1 pts) Lines 8–14 of the program p03.cc contain which of the following?
   (a) a function prototype
   (b) a function definition (for main)
   (c) a function call
   (d) a pre-processor directive

8. (2 pts) The variable b in p03.cc is
   (a) a formal parameter
   (b) an actual parameter

9. (2 pts) The variable b in p03.cc is
   (a) passed by value
   (b) passed by reference

10. (2 pts) The symbol & on line 16 of p03.cc indicates which of the following:
    (a) take the address of z
    (b) that the type of z is int *
    (c) that true pass-by-reference is used for parameter z
    (d) that both int and z are parameters of phooey

11. (2 pts) The output of p03.cc will be
    (a) z=1.5
        b=1
    (b) z=1
        b=1
    (c) z=2
        b=1
    (d) b=3
        z=2
    (e) z=3
        b=3
Questions 12 through 17 deal with the code for \texttt{p02.cc} on page 15.

12. (2 pts) Lines 16–20 of the program \texttt{p02.cc} contain which of the following?
   
   (a) a function prototype  
   (b) a function definition  
   (c) a function call  
   (d) a pre-processor directive

13. (2 pts) Line 6 of the program \texttt{p02.cc} contains which of the following?
   
   (a) a function prototype  
   (b) a function definition  
   (c) a function call  
   (d) a pre-processor directive

14. (2 pts) The variable \texttt{y} in \texttt{p02.cc} is
   
   (a) a formal parameter  
   (b) an actual parameter

15. (2 pts) The function \texttt{times} in \texttt{p01.cc} illustrates:
   
   (a) simulated, or “C-style” pass by reference (pass by pointer)  
   (b) true (C++ style) pass by reference  
   (c) pass by value

16. (2 pts) The symbol * on line 18 of program \texttt{p02.cc} indicates:
   
   (a) multiplication  
   (b) address of  
   (c) dereference  
   (d) assignment

17. (2 pts) The output of \texttt{p02.cc} will be
   
   (a) \( y=9 \)  
   \( b=7 \)  
   (b) \( y=7 \)  
   \( b=9 \)  
   (c) \( b=7 \)  
   \( y=63 \)  
   (d) \( b=63 \)  
   \( y=63 \)  
   (e) \( y=63 \)  
   \( b=7 \)
Questions 20 through 19 deal with number conversions.

18. (3 pts) Convert 187 from decimal to binary
   (a) 0001 0111
   (b) 0110 0111
   (c) 1011 1011
   (d) 0001 1011
   (e) 0111 0111

19. (3 pts) Convert 56 from octal to decimal
   (a) 46
   (b) 11
   (c) 101 110
   (d) 0101 0110
   (e) 56

20. (3 pts) Convert 01011101 from base 2 to base 16
   (a) 513
   (b) 5C
   (c) 5D
   (d) 93
   (e) 512
Questions 21 through 22 involve comparing p02.cc on page 15 with p03.cc on page 16.

21. (2 pts) Suppose line 11 of p02.cc were replaced with:

\[
\text{times}(b-3);
\]

What would be the result if you tried to compile and run?

(a) \( \text{y}=36 \)  
    \( b=7 \)
(b) \( \text{y}=36 \)  
    \( b=4 \)
(c) \( \text{y}=7 \)  
    \( b=36 \)
(d) \( \text{b}=7 \)  
    \( \text{y}=36 \)
(e) You’d get a syntax error, because you can’t pass \( (b-3) \) to \text{times}.

22. (2 pts) Suppose line 11 of p03.cc were replaced with:

\[
\text{phooey}(b+2);
\]

What would be the result if you tried to compile and run?

(a) \( \text{z}=2 \)  
    \( b=3 \)
(b) \( \text{z}=2.5 \)  
    \( b=5 \)
(c) \( \text{b}=3 \)  
    \( \text{z}=2 \)
(d) \( \text{z}=3 \)  
    \( b=3 \)
(e) You’d get a syntax error, because you can’t pass \( (b+2) \) to \text{phooey}. 
Section 2. Short Answer (answer on this sheet)

23. (30 pts) Write a complete C++ program to solve the problem outlined on page 16. Be sure to include:

- an opening comment (don’t put your name in the comment! -2 pts if you do!)
- all necessary “stuff” that goes before the main program
- a full main program complete with comments
Space for your answer.
There is more space on the next two pages in case you need it.
Extra space in case you need it
Extra space in case you need it
24. (20 pts) In lab3, you wrote a function called “outlineBox” that took three parameters, and produced boxes such as the following:

The function `drawZ` in the program listed below should operate in a similar manner.

The function should draw a picture on standard output in the shape of the plus sign of the given width, followed by a blank line. The height will always be equal to the width. Example output is on the next page.

Restriction:

- Width must be greater than or equal to 3. If this condition is not met the function should just return without printing anything. No error message should be produced.

Sample output appears below.

The complete program appears on the next page (with the body of function `drawZ` omitted), with sample output on the following page. You may fill in the function in the space provided, or rewrite the complete function in the blank space (beside or below the sample output.)

There is also a `helper()` function that you may use to factor out duplicate code; you are not required to do this, but it will save you time if you do.

```
stimpy[3:17am]> ./drawZ
aaaaa
  a
  a
aaaaa
bbbbbbb
    b
    b
    b
    b
bbbbbbb
cccc
  c
  c
cccc
  eee
  e
  eee
stimpy[3:17am]>
```
// drawZ.cc  Exam question for CISC181
// P. Conrad, 10/12/05

#include <iostream>
using namespace std;

void helper(int width, char c)
{

}

void drawZ(int width, char c)
{

}

int main(void)
{
  drawZ(5,'a');
  drawZ(7,'b');
  drawZ(4,'c');
  drawZ(1,'d');
  drawZ(3,'e');
  return 0;
}
End of Exam. Total Points: 100

2 D K B 3 7 T P 1 8 2 D 6 J F 3 N Q X C P E 3 8 C
// p01.cc  CISC181 Exam
#include <iostream>
using namespace std;

void fun(int *w);

int main(void)
{
    int a = 2;
    fun(&a);
    cout << "a=" << a << endl;
    return 0;
}

void fun(int *w)
{
    (*w) = 7;
    cout << "(*w)=" << (*w) << endl;
}

// p02.cc  CISC181 Exam
#include <iostream>
using namespace std;

void times(int y);

int main(void)
{
    int b = 7;
    times(b);
    cout << "b=" << b << endl;
    return 0;
}

void times(int y)
{
    y = y * 9;
    cout << "y=" << y << endl;
}
Problem Statement for Question 23: Ask the user of the program to input three integers. Determine whether the largest of the three numbers is the product of the other two. For example:

- For input of 10 2 5, the program would print:

  10 is the product of 2 and 5.

- For input of 5 17 3, the program would print:

  17 is not the product of 5 and 3.

- The numbers other than the largest may be in any arbitrary order—it is equally acceptable if the output for 5 17 3 is:

  17 is not the product of 3 and 5.

- Check for one error condition: the three numbers must all be different. If any of the numbers is equal to either of the two others, print an error message and end the program immediately. For example, for input of 3 1 3, print:

  Sorry: the numbers must all be different.

- Your program should provide appropriate prompts to the user, and should also label the output appropriately and neatly.
1. (b)Lecture notes 02/08/06

2. (b)Lecture notes 02/13/06

3. (c)

4. (b)

5. (a)

6. (b)

7. (b)

8. (b)

9. (b)

10. (c)

11. (b)

12. (b)

13. (a)

14. (a)

15. (c)

16. (a)

17. (e)

18. (c)

19. (a)

20. (c)

21. (a)

22. (e)
#include <iostream>
using namespace std;

int main(void)
{
    int num1, num2;
    int smaller, larger;
    // prompt user for input
    cout << "Enter an integer : ";
    cin >> num1;
    cout << "Enter another integer: ";
    cin >> num2;
    // check for error condition
    if (num1 < 0 || num2 < 0)
    {
        cerr << "Neither number may be negative" << endl;
        exit(1);
    }
    // determine which is larger
    if (num1 <= num2)
    {
        smaller = num1; larger = num2;
    }
    else
    {
        smaller = num2; larger = num1;
    }
    // produce output
    cout << larger << " is ";
    cout << ( (smaller * smaller == larger) ? "" : "not ");
    cout << "the square of " << smaller << endl;
    return 0;
}
// drawZ.cc  Exam question for CISC181
// P. Conrad, 10/12/05

#include <iostream>
using namespace std;

void helper(int width, char c)
{
    int i;
    for (i = 0; i < width; i++)
    {
        cout << c ;
    }
    cout << endl;
}

void drawZ(int width, char c)
{
    if (width < 3) // if width is less than 3
        return;
    int i, j;
    helper(width, c); // draw top of Z
    // nested loop for cross bar
    for (i = width-2; i>0; i--) // count down to 1
    {
        for (j = 0; j < i; j++) // i spaces
            cout << ' '; //
        cout << c << endl;
    }
    helper(width, c); // draw bottom of Z
    return;
}

int main(void)
{
    drawZ(5,'a');
    drawZ(7,'b');
    drawZ(4,'c');
    drawZ(1,'d');
    drawZ(3,'e');
    return 0;
}

End of Key, version C  Total Points: 0