

CSE 333 Midterm Exam
April 27th, 2012

Your Name: _____

Student ID: _____

General Information:

This is a closed book examination. You have **50 minutes** to answer as many questions as possible. The numbers in parentheses at the beginning of each question indicate the number of points given to the question. There are **10 pages** on this exam (check to make sure you have all of them), and there is a total of **100 points** in all. Write all of your answers directly on this paper. Make your answers as concise as possible. If there is something in the question that you believe is open to interpretation, then please go ahead and interpret, but state your assumptions in your answer.

If you need to tear a page out of the midterm to avoid flipping back and forth, do so carefully; don't tear out any pages with your writing on it, and be careful of the staple!

	Points available	You earned
Problem 1	25	
Problem 2	30	
Problem 3	20	
Problem 4	25	
Problem 5	+1	
Total:	100	

Problem 1: Pointer precision, please (25 points)

What is the output of the following C program? (The lines that lead to the printing of output are in bold.). There is space for your answer on the next page.

```
#include <stdio.h>
#include <stdlib.h>

void displayarray(int *x, int len) {
    int i;
    for (i = 0; i < len; i++) {
        printf("%d", x[i]);
        printf("%s", (i == len-1 ) ? "\n" : " ");
    }
}

int main(int argc, char **argv) {
    int a1[] = {1, 2, 3, 4, 5, 6, 7};
    int a2[3] = {1, 3, 5};
    int i, *ptr;

    displayarray(a1, 7);

    for (i=0; i<3; i++) {
        int old;
        ptr = &(a1[0]) + a2[i];
        old = ptr[1];
        ptr[1] = ptr[0];
        ptr[0] = old;
    }
    displayarray(a1, 7);

    (*(ptr-1))++;
    displayarray(ptr-2, 2);

    return EXIT_SUCCESS;
}
```

(more space for problem 1.)

Problem 2: Bug bashing (30 points)

The following program has bugs. Circle the bugs, write code that repairs the bugs, and if your bugfix is on a different line than the bug, write a comment next to the bugfix with the bug line number that it fixes. Ignore stylistic issues; find and fix actual bugs. There are a minimum of 15 changes you need to make. (!!)

```
1  #include <iostream>
2  #include <stdlib.h>
3
4
5  // A class that stores two different things.
6
7  template <class X, class Y> class Pair {
8
9      public:
10
11         Pair(X a, Y b) { first_ = a; second_ = b; }
12
13         void Set(X *a, Y &b) {
14             first_ = *a;
15             second_ = &b;
16         }
17
18         void Get(X a, Y b) {
19             a = first_;
20             b = second_;
21         }
22
23     private:
24         X first_;
25         Y second_;
26 };
27
28 int main(int argc, char **argv) {
29
30     Pair<string,int> si_pair("hello", 2);
31
32     Pair<int, string> *is_pair =
33         new Pair<string,int>(3, "there");
34
35     string a;
36     int b;
37
38     si_pair.Get(a, b);
39     is_pair->Set(*a, &b);
40
41     delete[] is_pair;
42     return EXIT_SUCCESS;
43 }
```

(more space for problem 2.)

Problem 3: C Code Can Copy. (20 points)

In this problem, you will write some C code. Your job is to:

- a) in file “copyarray.c”, define a function CopyArray() that:
 - i. accepts an array of integers as a first parameter
 - ii. accepts an integer (the length of the array) as a second parameter
 - iii. has a third parameter that is an output parameter (see v.)
 - iv. allocates space for a copy of the array, and copies the array into it
 - v. returns the newly allocated/copied array through the output parameter (see iii.)
 - vi. returns “1” on success and “0” on failure
- b) in file “copyarray.h”, declare a prototype for CopyArray().
- c) in file “copymain.c”, implement main() to test the correctness of CopyArray().

Be sure to write defensive code. Also, make sure your code has no memory leaks. Feel free to use C standard library functions to get the job done, but #include the right header if you do so. If there are corner cases, do something reasonable to handle them. You have this page, plus two blank pages, to write your code.

(more space for problem 3.)

(more space for problem 3.)

Problem 4: Resplendent reference referendum (25 points)

Write the output of the following C++ code.

```
#include <stdlib.h>
#include <iostream>

int mystery(int *a, int &b, int c) {
    c++;
    b = b + c;
    *a = b;
    return *a - c;
}

int main(int argc, char **argv) {
    int w = 0, x = 1, y;
    y = mystery(&w, x, 5);

    int *a = &w;
    int &b = w;

    *a = mystery(&b, b, 6);

    std::cout << *a << " " << b << " " << w << " ";
    std::cout << x << " " << y << std::endl;
    return 0;
}
```

Problem 5: A free point (1 point!)

Draw something fun...