

OIJ-1106 Programming I

Class Exam

Monday 30 January 2012

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Make sure you read the questions carefully before giving your answer. Put your name and student number on each answer sheet.

This exam consists of 3 pages / 7 exercises. The maximum amount of points is 70. Each exercise is worth 10 points.

Written material, mobile phones and calculators are NOT allowed in the exam.

Good luck!

Exercise 1

Briefly differentiate between the following terms.

- Precedence *versus* associativity
- Lifetime *versus* scope
- Declaration *versus* definition
- Type coercion *versus* type casting
- Compilation *versus* linking

Exercise 2

Consider the following program, which is missing a function named func:

```
#include <iostream>
using namespace std;
// missing function func goes here
int main ()
{
    int r, s, t;
    r = 6; s = 8;
    t = func(r, s);
    cout << r << " " << s << " " << t << endl;
    return 0;
}
```

- a. Show the output generated by this program if we add the following function func to the program?

```
int func (int &x, int y)
{
    x = x + 3;
    y = y + 4;
    return (x+y);
}
```

- b. Show the output generated by this program if we instead add the following function func to the program?

```
int func (int x, int y)
{
    int z;
    z = x + y;
    x = x + 3;
    y = y + 4;
    return (z);
}
```

c. Show the output generated by this program if we instead add the following function func to this program?

```
int func (int &x, int &y)
{
    x = x + 3;
    y = y + 4;
    return (x+y);
}
```

Exercise 3

Given the declarations

```
int a[5][10][15];
int b[2][5][6][3];
```

- a. Array a has dimension _____ and size _____
 Array b has dimension _____ and size _____

- b. Remembering that a multidimensional array is stored as a single dimension array, given the definition
 float twoD[4][4];

Make a drawing which shows how the array is stored. Indicate on the drawing the positions of twoD[0][3] and twoD[3][2]

Exercise 4

For each of the following expressions indicate its value and type. If invalid, circle the expression.

Expression	Value	Type
10 + 3		
-9.4 - 6.2 * 2		
10.0 / 3.0		
10 / 3		
10 % 3		
10.0 % 3.0		
4 / 8		
(6 == 9) && (5 != 2)		
7 - 5 / 2.0		
!(2 == 2.0)		

Exercise 5

Given the declarations

```
typedef char CodeString[26];

enum StyleType {FORMAL, BRIEF};

struct RefType
{
    CodeString token[2000];
    CodeString symbol[20];
};
```

```

struct MapType
{
    CodeString    mapCode;
    StyleType    style;
    RefType      chart;
};

```

```

MapType    guide[200];
MapType    aMap;
RefType    aRef;
int        count;
CodeString    aCode;

```

a. mark each of the following statements as valid or invalid. (Assume that all the valid variables have been assigned values.)

Statement	Valid	Invalid
if (aMap.style == BRIEF) count++;		
guide[1].chart.token[2] = aMap;		
guide[6].chart = aRef;		
aMap.chart = aRef;		

b. Using the declarations above, write a single statement to do each of the following:

- i. Assign the value of the chart member of the seventy-first element of guide to the value aRef.
- ii. Assign the value 'X' to the first element of the twenty-third element of the token member of the chart member of the ninety-fourth element of guide.

Exercise 6

- a. Binary search assumes something on the list to be searched. What is it?
- b. Using a sequence of figures, show the execution steps of binary search on the following list when searching for a target of value 10. Please mention in your drawing the important variables binary search uses (low, mid, high).

Input list:

1	4	7	10	11	19	21	24	30
---	---	---	----	----	----	----	----	----

Exercise 7

Write a C++ function that will calculate average gas mileage for a car. The function should prompt the user to input a starting mileage. Then, the user will be prompted to enter how many gallons were entered at each fill up. The user will continue to enter fill-up amounts until they enter a sentinel value of 999 at which point they should be prompted for the ending mileage. Calculate the miles per gallon based upon the amount of fuel used and the number of miles travelled and display the result neatly formatted to 2 decimal places.