Fraser International College

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CMPT 130: Introduction to Computing Science and Programming I Midterm Exam

July 2

2016

Instructions: Read each question carefully and write all your answers ON THE SPACE PROVIDED IN THIS QUESTION BOOKLET under each question. If the space provided is not enough for you, use the back of the page making sure to indicate question number. This midterm examination is closed book. No reference material including but not limited to printed, electronic, or otherwise is allowed. In particular, watches and phones are strictly prohibited inside the examination. You are allowed to have only pen, pencil, and eraser. Write legibly. Coding style will be marked; therefore make sure to write your code with proper brackets, indentation, spelling and capitalization. Use the blank back pages for scratch work.

Total Marks 100
Duration 120 min
Total Pages 10

For Instructor Use Only								
Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Total**

Question 1 (10 marks)

Given the binary BYTE **0110 1100**

a. What decimal value does it represent assuming it is unsigned binary?

Answer:_____

b. What decimal value does it represent assuming it is sign and magnitude representation?

Answer:_____

c. What decimal value does it represent assuming it is two's complement representation?

Answer:_____

d. What Ascii character does it represent? Remember that the Ascii code for '**A**' is **65**, '**B**' is **66**, '**C**' is **67**, …, '**Z**' is **90**; and that of '**a**' is **97**, '**b**' is **98**, '**c**' is **99**, …, '**z**' is **122**.

Answer:_____

e. What is the hexadecimal representation of the given binary?

Answer:_____

Question 2 (30 Marks)

What is the output of the following C++ code segments? Assume that they are embedded inside valid C++ main programs and any required library is included. ***If there is no output, write no output.***

	C++ Code Segment	Output

2.1	`int n = 5;`
	`int m = -7;`
	`while (n++ < 13)`
	`{`
	`  if (n % 4 == 0)`
	`  cout << n++ + ++m << "  ";`
	`  else`
	`  cout << n++ - --m << "  ";`
	`}`
		6 marks

2.2	`int a = 25;`
	`int b = 4;`
	`cout << a/b << endl;`
	`cout << static_cast<float>(a)/b << endl;`
	`cout << a/static_cast<float>(b) << endl;`
	`cout << static_cast<float>(a/b) << endl;`
	`cout << a/b << endl;`
		2.5 marks

2.3	`int x = 0;`
	`for (int i = 0; i < 4; ++i)`
	`{`
	`  for(int j = i; j > 0; --j)`
	`  x += 2;`
	`  cout << x << endl;`
	`}`
		6 marks

2.4	`int n = 1;`
	`if (n > 1)`
	`  cout << "Nice" << endl;`
	`  cout << "Too bad." << endl;`
	`cout << "Good Bye." << endl;`
		1.5 marks

2.5	`char ch1 = 'A';`
	`char ch2 = 'H';`
	`int sth = ch2 - 3;`
	`cout << sth << endl;`
	`cout << ch2 – ch1 << endl;`
		2 marks

2.6	`int foo(int a, int b)`
	`{`
	`  int sth = a + b;`
	`  return sth;`
	`}`
	`int main()`
	`{`
	`  int a = foo(10.7, 5);`
	`  cout << a << endl;`
	`  return 0;`
	`}`
		2 marks

2.7	`int n = 10;`
	`while (n > 0)`
	`    n /= 2;`
	`cout << n * n << endl;`
		2 marks

2.8	`int do_something(int x)`
	`{`
	`    return x*x;`
	`    cout << "Easy" << endl;`
	`}`
	`int main()`
	`{`
	`    int a = do_something(5);`
	`    cout << a << endl;`
	`    return 0;`
	`}`
		2 marks

2.9	`int x = 5, y = 7;`
	`int z = x != y ? y : x;`
	`cout << z << endl;`
		1 mark

2.10	`int A[] = {7, -3,  4,  9,  -2};`
	`int count = 0;`
	`int index = 1;`
	`while (count < 5)`
	`{`
	`    cout << A[index] << endl;`
	`    count++;`
	`    index = index + 2;`
	`    index = index % 5;`
	`}`
		5 marks

Question 3 (5 Marks)

Consider the following code fragment that uses a do-while loop. Re-write the code fragment using a while loop.

```
int x;
do
{
    cout << "Enter value of x ";
    cin >> x;
} while (x <= 0);
cout << "The value of x is " << x << endl;
```

Question 4 (6 Marks)

Consider the following code fragment that contains **if - else if - else** conditional statements. Re-write the code by removing redundant (not necessary) conditional tests.

```
float income;
cout << "Enter your monthly income: ";
cin >> income;
if (income < 0.0)
    cout << "Invalid." << endl;
else if (income >= 0.0 && income < 1200.00)
    cout << "Poor." << endl;
else if (income >= 1200.00 && income < 2500.00)
    cout << "Ok." << endl;
else if (income >= 2500.00)
    cout << "Rich." << endl;
```

Question 5 (10 Marks)

Write a function named **rotateArray** that takes an array of floats and the size of the array as arguments and rotates the elements of the array to the left by one. This means the first element of the array should be rotated to end of the array. You are not allowed to declare an array inside the function body. For example calling the function on the array **[5, 7, 1, 9, 0]** will rotate it and change it to **[7, 1, 9, 0, 5].**

Question 6 (12 marks)

Write a complete a C++ program that generates a random integer in the range [5, 100] and then **prints all the divisors** of the random number generated in decreasing order. You must include all the required includes and namespaces.

Question 7 (12 Marks)

Write a function named **isPalindrome** that takes a **non-negative** integer argument and returns true if the number reads the same backwards and forward and returns false otherwise. For example calling the function with 34543 will return true; calling it with 1231 will return false, and calling it with 8 will return true.

Question 8 (15 Marks)

a. **[5 Marks]** Write a function named **isFound** that takes three arguments, namely an array of integers, its size and an integer value **m**; and then returns true if **m** is found in the array and returns false otherwise.

b. **[10 Marks]** Write a function named **isContained** that takes as its arguments two arrays of integers **A1** and **A2** and their sizes **size1** and **size2** respectively; and returns true if all the elements of the array **A1** are contained in the array **A2**; and returns false otherwise. In this question, you must use the function defined in part (a) above.