

INTRODUCTION TO PROGRAMMING

cSE1 41

First Term Examination

Max Marks: 50

Time Allowed: 90 minutes

Answer the questions in the spaces provided on the question sheets.
Please give clear and rigorous answers.
Be to the point. Show your work.

Name: _____

ERP: _____

Question:	Expressions	Conditionals & Loops	Arrays	Debugging	Programming	Total
Points:	10	9	13	6	12	50
Score:						

Question 1: Expressions 10 marks

For each of the C++ expressions below, write down the type of the expression and its value. If the expression causes a syntax or run-time error, write an X in both boxes.

Expression	Type	Value
<code>1 + 2 + "3" + 4 + 5</code>		
<code>(double) (3 / 2)</code>		
<code>(true false) && true</code>		
<code>3 / 2.0 + 2 * 5</code>		
<code>Integer.parseInt("123")</code>		
<code>1 < 2 < 3</code>		
<code>"100" + 99</code>		
<code>3 + static_cast<int>(std::ran</code>		

<code>d() / (RAND_MAX + 1.0));</code>		
<code>11 * (int)0.2</code>		
<code>11 * 0.2</code>		

Question 2: Conditionals & Loops 9 marks

(a) [2 marks] What output is produced by the segment of code shown below:

```

1 int x = 13;
2 if (x != 13)
3     Std::cout<<"C++";
4 else
5     std::cout<<"PYTHON";

```

(b) [2 marks] What output is produced by the segment of code shown below:

```

1 int x = 12;
2 if (x > 12) {
3     if ( x < 15)
4         Std::cout<<"BLACK";
5 } else
6     Std::cout<<"BLUE");
7 Std::cout<<"JEANS";

```

(c) [3 marks] Consider the following C++ code fragment:

```

1 int N = 4;
2 int a[N]={0,0,0,0};
3 for(int i=0; i<N; i++)
4     a[N-i-1] = i;

```

Fill in the following trace of the values of *a* just after each iteration of the for loop.

<i>i</i>	<i>a</i>
	{0, 0, 0, 0}
0	
1	
2	
3	

(d) [2 marks] Consider the following C++ code fragment:

```

1 int s = 1;
2 while(s < 15)
3     s = s + s;

```

Write the value of *s* after the loop terminates:

Question 3: Arrays 13 marks

(a) [4 marks] Which of the following are true of C++ arrays. Circle all that apply.

- i. Given an array `a[]` that has been declared and initialized, accessing `a[a.length]` results in a runtime error.
- ii. Can change the size of the array after creation.
- iii. Array entries are auto-initialized to `0.0` when creating an array of type **double**.
- iv. If `a` and `b` are arrays of the same length, then the code `a = b` copies each element of `b` to the corresponding in `a`.

(b) [4 marks] Among the following code fragments, circle the ones that will not cause a compile-time error.

- i. `int a = {1, 2, 3};`
- ii. `int a[3] = {1, 2, 3}; int b[3] = a;`
- iii. `Int a[30]`
- iv. `Int a[10];`
- v. `Int a[];`
- vi. `int a[3] = {1, 2, 3}; int b = a;`

(c) [5 marks] Write a program that generate N random integers (each between 0 and 10 (inclusive)) and store them in an array, where N is given as command-line argument. The program next output the sum and average of the generated random numbers.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Question 4: Debugging6 marks

Consider the following program, which is supposed to print out the powers of 3 from 3^0 up to and including 3^N , where N is a non-negative integer that is read from the command line.

```
string argv="423121";
int N = argv[1];
long result = 0;
int i = 0;

while (i < N)
{
    std::cout << "3^" << i << " = " << result << std::endl;
    result *= 3;
    i++;
}
```

This program has three bugs.

- (a) Which bug prevents the program from compiling successfully? Identify the line number where the bug appears and give a correct version of this line of code.

Line number: Correct version:

- (b) Identify the line numbers where the two runtime bugs appear and give a correct version of each line of code.

Line number: Correct version:

Line number: Correct version:

Question 5: Programming

12 marks

- (a) [6 marks] Suppose you want to develop a program to play lottery. The program randomly generates a lottery of a two-digit number, read a two-digit number from command-line, and determines whether the user wins according to the following rules:
- If the user input matches the lottery number in the exact order, the award is \$10,000.
 - If all digits in the user input match all digits in the lottery number, the award is \$3,000.
 - If one digit in the user input matches a digit in the lottery number, the award is \$1,000.

(b) [6 marks] (*Find numbers divisible by 5 or 6, but not both*) Write a program that displays all the numbers from 100 to 200, ten per line, that are divisible by 5 or 6, but not both. Numbers are separated by exactly one space.