INTRODUCTION TO PROGRAMMING

cSE1
41

Second Term Examination

Max Marks: 35 Time Allowed: $1\frac{1}{2}$ hours

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:** ______

Page:	1	2	3	4	5	6	Total
Marks:	5	10	4	6	6	4	35
Score:							

Question 1: . . . . *5 marks*

(a) [3 marks] Write statements to do the following:

i. Create an array to hold 10 `double` values.

. . . .

ii. Assign the value 5.5 to the last element in an array of `double`s.

. . . .

iii. Use an array initializer to create another array with the initial values 3.5, 5.5, 4.52, and 5.6.

. . . .

(b) [2 marks] Give the sequence of integers printed by a call to `print(7)`:

```
void print(int n) {
if (n <= 0) return;
std::cout<<n<<” “;
print(n-2);
std::cout<<n<<” “;
```

```
}
```

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Question 2: .... *10 marks*

Each of the following code snippets contains a print statement. However, some of them contain errors. For each of the snippets below, either categorize the error as a compilation error or runtime error, or, if there is no error, provide the output of the program.

A.
B.

```
Int a[5];
Std::cout<<a[5];
```

Q compilation error
Q runtime error
Q no error; the output is: ________

C.
D.

```
Int a[5];
Std::cout<<a.length;
```

Q compilation error
Q runtime error
Q no error; the output is: ________

C.

```
Int a[3] = {1, 2, 3};
int b[3] = {1, 2, 3};
 Cout<<a == b;
```

Q compilation error
Q runtime error
Q no error; the output is: ________

D.

```
Int a[5] = {2, 4, 6, 8,
10};
Int b[] = a;
std::cout<<b[3];
```

Q compilation error
Q runtime error
Q no error; the output is: ________

E.
F.

```
Int a[];
Std::cout<<a[3];
```

Q compilation error
Q runtime error
Q no error; the output is: ________

```
int a[] = {1, 2, 3, 4, 5};
   a = new int[4];

   for (int i = 0; i < 4; i++) {
      a[i] = 2 * i;
   }

  std::cout << a[3] << std::endl;
```

Q compilation error
Q runtime error
Q no error; the output is: ________

Question 3: .... *4 marks*

(a) [2 marks] Write a method called `swapPairs` that accepts an array of integers and swaps the elements at adjacent indexes. That is, elements 0 and 1 are swapped, elements 2 and 3 are swapped, and so on. If the array has an odd length, the final element should be left unmodified. For example, the list $\{10, 20, 30, 40, 50\}$ should become $\{20, 10, 40, 30, 50\}$ after a call to your method.

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(b) [2 marks] Assume that a two-dimensional rectangular array of integers called `data` has been declared with four rows and seven columns. Write a loop to initialize the third rowof `data` to store the numbers 1 through 7.

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Question 4: ....*6 marks*

(a) [3 marks] Write a method called `append` that accepts two integer arrays as parameters and returns a new array that contains the result of appending the second array's valuesat the end of the first array. For example, if arrays `list1` and `list2` store $\{2, 4, 6\}$ and $\{1, 2, 3, 4, 5\}$ respectively, the call of `append(list1, list2)` should return a new array containing $\{2, 4, 6, 1, 2, 3, 4, 5\}$. If the call instead had been `append(list2, list1)`, the method would return an array containing $\{1, 2, 3, 4, 5, 2, 4, 6\}$.

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(b) [3 marks] Convert the following iterative method into a recursive method:

```
// Prints each character of the string reversed twice.
// doubleReverse("hello") prints oollllleehh
void doubleReverse(String s) {
   for (int i = s.length() - 1; i >= 0; i--) {
      std::cout<<s[i];
      std::cout<<s[i];
   }
}
```

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Question 5: ....*6 marks*

(a) [3 marks] Consider the following method:

```
void mystery1(int n) {
   if (n <= 1) {
   std::cout<<n;
   } else {
      mystery1(n / 2);
      std::cout<<", "<<n;
   }
}
```

For each of the following calls, indicate the output that is produced by the method:

i. `mystery1(1);`

ii. `mystery1(2);`

iii. `mystery1(10);`

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(b) [3 marks] Consider the following method:

```
int mystery2(int x, int y) {
   if (x < y) {
      return x;
   } else {
      return mystery2(x-y, y);
   }
}
```

For each of the following calls, indicate the value that is returned:

i. `mystery2(6, 13)`

ii. `mystery2(8, 2)`

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Question 6: .... *4 marks*

Write a method called `writeSequence` that accepts an integer n as a parameter and prints to the console a symmetric sequence of n numbers composed of descending integers that ends in 1, followed by a sequence of ascending integers that begins with 1. The following table indicates the output that should be produced for various values of n:

Method call	Output produced
`writeSequence(1);`	`1`
`writeSequence(2);`	`1 1`
`writeSequence(3);`	`2 1 2`
`writeSequence(4);`	`2 1 1 2`
`writeSequence(5);`	`3 2 1 2 3`
`writeSequence(6);`	`3 2 1 1 2 3`
`writeSequence(7);`	`4 3 2 1 2 3 4`
`writeSequence(8);`	`4 3 2 1 1 2 3 4`
`writeSequence(9);`	`5 4 3 2 1 2 3 4 5`
`writeSequence(10);`	`5 4 3 2 1 1 2 3 4 5`

Notice that when n is odd the sequence has a single 1 in the middle, while for even values it has two 1s in the middle.