

Full Name: _____ Gannon Identification Number: _____

ECE 111: Introduction to C and C++ Programming
Spring 2023, Final/Third Examination
Gannon University (GU)
May 02, 2023

Please do not turn the page until you are informed.

Rules:

- The exam is closed-book, closed-note, closed shared calculator, and closed electronics.
- Please stop promptly at **6:00 PM**.
- There are **30 points** total, distributed **evenly** among **3** questions.

Question	Maximum	Earned
1	10	
2	10	
3	10	

Advice:

- Read questions carefully. Understand a question before you start writing your answer.
- Write down thoughts and intermediate steps so you can get partial credit. Clearly circle your final answer.
- The questions are not necessarily in order of difficulty. **Skip around.** Make sure you get to all the problems.

Wishing you the best of luck,
Dr. Shayan (Sean) Taheri

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Question 1. (10 points) Complete the following items on **Control Structures and Value-Returning Functions**.

A – Part 1. Write a value-returning function, **isVowel**, that returns the value true if a given character is a vowel and otherwise returns false. Explain the reason(s).

A – Part 2. Mark the following statements as true or false. Explain the reason(s).

- Parameters allow you to use different values each time the function is called.
- In C++, the names of the corresponding formal and actual parameters must be the same.
- In C++, function definitions can be nested; that is, the definition of one function can be enclosed in the body of another function.
- The memory for a static variable remains allocated between function calls.

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B. Write the missing statements in the following program so that it prompts the user to input two numbers. If one of the numbers is 0 or negative, the program outputs both numbers must be positive. If both the numbers are equal, it outputs the sum of the numbers; if the first number is less than or equal to 2 and both the numbers are not equal, it outputs second number to the power of the first number; otherwise, it outputs the product of the numbers. Explain the reason(s).

```
#include <iostream>

//Include additional header files, if necessary

using namespace std;
int main()
{
    double firstNum, secondNum;
    cout << "Enter two nonzero numbers: ";
    cin >> firstNum >> secondNum;
    cout << endl;

    //Missing statements

    return 0;
}
```

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Question 2. (10 points) Complete the following items on **Arrays and Two- and Multidimensional Arrays**.

A – Part 1. Write a program that prompts the user to input a string and outputs the string in uppercase letters (Use a character array to store the string). Explain the reason(s).

A – Part 2. Consider the following declarations. Explain the reason(s).

```
const int CAR_TYPES = 5;  
const int COLOR_TYPES = 6;  
double sales[CAR_TYPES][COLOR_TYPES];
```

- How many components does the array sales have?
- What is the number of rows in the array sales?
- What is the number of columns in the array sales?
- To sum the sales by **CAR_TYPES**, what kind of processing is required?
- To sum the sales by **COLOR_TYPES**, what kind of processing is required?

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B. What is the output of the following program? Explain the reason(s).

```
#include <iostream>
using namespace std;
int main()
{
    int list[5];
    list[4] = 10;
    for (int i = 3; i >= 0; i--)
    {
        list[i] = 3 * list[i + 1];
        list[i + 1] = i * list[i];
    }
    cout << "list: ";
    for (int i = 0; i < 5; i++)
        cout << list[i] << " ";
    cout << endl;
    return 0;
}
```

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Question 3. (10 points) Complete the following items on **Records (structs) and Classes**.

A – Part 1. Mark the following statements as true or false. Explain the reason(s).

- All members of a struct must be of different types.
- Some aggregate input/output operations are allowed on a struct variable.
- A function cannot return a value of the type struct.

A – Part 2. Write C++ statements to store the following information in **classList[0]**. Explain the reason(s).

```
struct nameType      struct courseType      struct studentType
{
    string first;      {
    string last;        string name;
};                    int callNum;
                     int credits;
                     char grade;
                     };
};
```

name: Jessica Miller
gpa: 3.8
course name: Data Structure
course call number: 8340
course credits: 3
course grade: B

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B – Part 1. Mark the following statements as true or false. Explain the reason(s).

- The member variables of a class must be of the same type.
- The member functions of a class must be public.
- A class can have more than one constructor.

B – Part 2. Find the syntax errors in the following class definition. Explain the reason(s).

```
class syntaxErrors4
{
public:
    set(string, int, double);
    void print() const;
    syntaxErrors4() const;
    syntaxErrors4(string, int, double);
private:
    string n;
    int ID;
    double bal;
}
```