

## Q1 Lab 03 Github Link

0 Points

<https://github.umn.edu/umn-csci-3081-F22/public-lab03>

## Q2 Type Sizes: Pointers

5 Points

How many bytes of memory are needed to store a pointer?

8 bytes

Therefore, the lab machines are these types of systems:

☐ 32-bit

☒ 64-bit

## Q3 Type Sizes: Shorts

5 Points

Based on the results, how many possible short values are there? **Hint:** 8 bits in 1 byte and there are  $2^{32}$  possible integers. (Calculate a number)

65536

How many possible "unsigned short" values are there? (Calculate a number)

65536

What do you think would be the difference between an unsigned short and a short? (think about this)

## Q4 Type Sizes: Passing by Value vs. Reference

5 Points

Assuming that references take up the same memory as a pointer, which are better in terms of minimizing memory copy?

☐ Passing DVec3 by value

☐ Passing IVec3 by value

☐ Passing dvecArray by value

☒ Passing DVec3 by reference

☒ Passing IVec3 by reference

☒ Passing dvecArray by reference

True or false, in terms of saving memory, it is always best to pass by reference.

☐ True

☒ False

If the only reason to pass by reference was to save space, what types might you want to consider passing by value?

☒ char

☒ short

☒ int

☒ long

☒ double

☒ unsigned char

☒ unsigned short

☒ unsigned int

☐ IVec3

☐ DVec3

## Q5 Type Sizes: Member Variable Ordering

5 Points

True or False, the ordering of variables in a class or struct does not change the amount of memory needed to store the variable data for a type.

☐ True

☒ False

## Q6 Type Sizes: Array Sizes

5 Points

Based on the information in the program, how would you calculate 384 bytes for dvecArray without running sizeof(...)?

☐  $16 * 6 * 4$

☒  $3 * 8 * 16$

☐  $6 * 8 * 8$

☐  $3 * 8 * 12$

☐  $2 * 12 * 16$

### Q7 Private Variables

5 Points

Use the "Private Variables" section of the program output to answer the following question:

Which of the following are true about the security of private member variables:

☒ We can read private member variables outside of public class methods.

☒ We can edit private member variables outside of public class methods.

☐ Private variables cannot be represented as other types (doubles cannot be viewed as integers).

### Q8 Byte Arrays: Int to byte array

5 Points

After casting an int to a byte array we got 44 10 0. We can say  $300 = 44a + 1b + 0 + 0$ . What are  $a$  and  $b$ ?

**Hint:** Consider that  $127 = 7 \times 10^0 + 2 \times 10^1 + 1 \times 10^2$ . Remember that for bytes, the base would be 256 instead of 10.

 $a =$ 

1

 $b =$ 

256

### Q9 Byte Arrays: Decode a message

5 Points

Decode this message stored as an integer: 1701013838

**Hint:** First change the number into a byte array (perhaps use the code) and then look up each byte in the ASCII table.

Record your answer here:

Nice

### Q10 Arrays: Array Size

5 Points

How many floats are in `array`?

4

How many bytes are there in `array`?

16

Q11 Arrays: Overflow

5 Points

Based on the program, what happens in C++ if memory is used past allocated space in an array?

- ☐ This is not possible
- ☐ Compile error
- ☐ Segfault
- ☐ Runtime error
- ☒ It will use whatever memory exists past the end of the array

Lab 03 Part A - C++ Memory and Debugging

GRADED

STUDENT

Ruijun Ni

TOTAL POINTS

50 / 50 pts

QUESTION 1

Lab 03 Github Link

0 / 0 pts

QUESTION 2

Type Sizes: Pointers

5 / 5 pts

QUESTION 3

Type Sizes: Shorts

5 / 5 pts

QUESTION 4

Type Sizes: Passing by Value vs. Reference

R 5 / 5 pts

QUESTION 5

Type Sizes: Member Variable Ordering

5 / 5 pts

QUESTION 6

Type Sizes: Array Sizes

5 / 5 pts

QUESTION 7

Private Variables

5 / 5 pts

QUESTION 8

Byte Arrays: Int to byte array

5 / 5 pts

QUESTION 9

<a href="#">Byte Arrays: Decode a message</a>	5 / 5 pts
QUESTION 10	
<a href="#">Arrays: Array Size</a>	5 / 5 pts
QUESTION 11	
<a href="#">Arrays: Overflow</a>	5 / 5 pts