

Q1 61C Review

(11 points)

Being comfortable manipulating the various number representations covered in 61C will help you succeed in the memory safety unit.

Q1.1 (1 point) What is the hexadecimal value of the decimal number 18?

0x12

Q1.2 (1 point) What is the value of `0x8339e833 + 0x20` in hexadecimal form?

0x8339e853

Q1.3 (1 point) What is the value of `0x550ecd2 + decimal 16` in hexadecimal form?

0x550ece02

Q1.4 (1 point) What is the largest unsigned 32-bit integer? What is the result of adding 1 to that number?

max: 0xffffffff

max + 1: 0x00000000

Solution: This is a result of unsigned overflow.

Q1.5 (1 point) What is the largest signed 32-bit integer? What is the result of adding 1 to that number?

max: 0x7fffffff

max + 1: 0x80000000

Solution: This is a result of signed overflow. `0x7fffffff` is $2^{31} - 1$ in decimal and `0x80000000` is -2^{31} in decimal.

Q1.6 (1 point) If you interpret an n-bit two's complement number as an unsigned number, would the negative numbers be smaller or larger than positive numbers?

☐ Smaller

☒ Larger

Solution: Negative numbers would be larger than positive numbers if interpreted as unsigned since their most significant bits are set.

(Question 1 continued...)

Q1.7 (1 point) How many bytes are needed to represent `char[16]`?

16 bytes

Solution: A character array with 16 elements in it needs 16 bytes to represent because each character is 1 byte.

Q1.8 (1 point) How many bytes are needed to represent `int[8]`?

32 bytes

Q1.9 (1 point) In a little-endian 32-bit system, how would you represent the pointer `0xDEADBEEF`?

0xEF	0xBE	0xAD	0xDE
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Q1.10 (1 point) In a little-endian 64-bit system, how would you represent the pointer `0xDEADBEEF`?

0xEF	0xBE	0xAD	0xDE	0x00	0x00	0x00	0x00
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Q1.11 (1 point) In a little-endian 32-bit system, how would you represent the char array `"ABCDEFGH"`?

Recall that our stack representation has addresses increase from left-to-right and bottom-to-top.

E	F	G	H
A	B	C	D