Name:

Instructions:

- Download a version of this document
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- Upload the document as your submission to this lab.

ASCII:

In class, we learned that the ASCII character set is a simple encoding. A hundred and twenty-seven characters were assigned a unique number. This number is known as its encoding. Correspondingly, when you are provided with an encoded value, you can decode the value to obtain the corresponding ASCII character.

For each row in the following table, complete the missing information by either encoding the ASCII character, decoding the numerical value, or by converting a numerical value into a different base.

ASCII	binary	octal	decimal	hexadecimal
a				
D				
LF				
EOT				
		050		
				0x6B
			126	

You can use the following as resources:

1. the ASCII table that is provide via the man page on ssh.sandbox.csun.edu: man ascii
2. the gdb debugger on ssh.sandbox.csun.edu
    - $ ssh ssh.sandbox.csun.edu
    - $ gdb
    - (gdb) print /t 's'
    - (gdb) print /c 0x3D
    - (gdb) quit

UTF-8 Encoding

The professor provided an algorithm to convert a UTF-8 character, e.g., U+043F to its binary encoding. Use this algorithm to complete the following table.

UTF-8	Name / Character	binary	octal	decimal	hexadecimal
U+205D					0xe2819d
U+003D	Equal Sign				0x003D
U+03F0					0xcfb0
U+10D32	HANIFI ROHINGYA DIGIT TWO				0xf090b4b2

Show your work each step of the way:

1. U+205D, e2819d 2. 0x205D 3.			

Unary Numbering System:

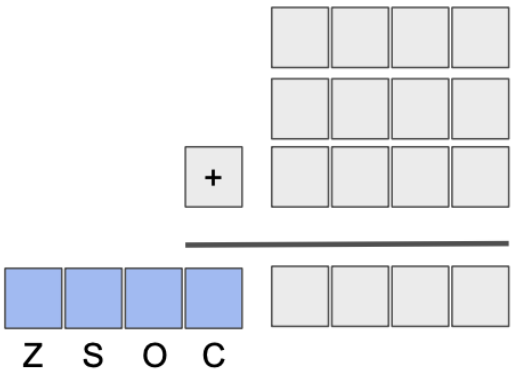
Encode the following numbers using the Unary Numbering System. For all answers include the final stop bit.

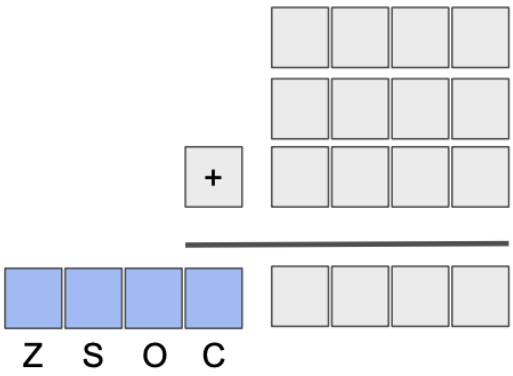
Decimal	Unary Number
4	11110
5	
8	
23	
435	

Mathematical Review:

Add the following base 10 numbers together. Show all your work, and make sure you also provide the appropriate values of the status bits

- 365 + 36
- 3486 + 6666

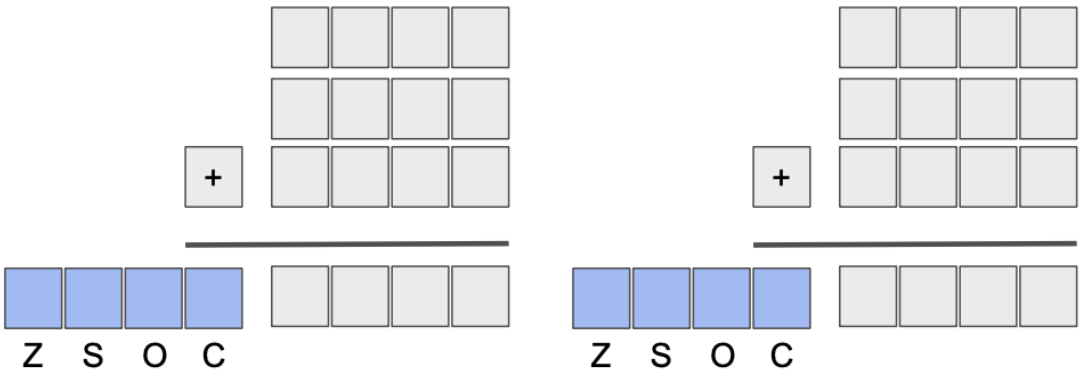




Binary Addition

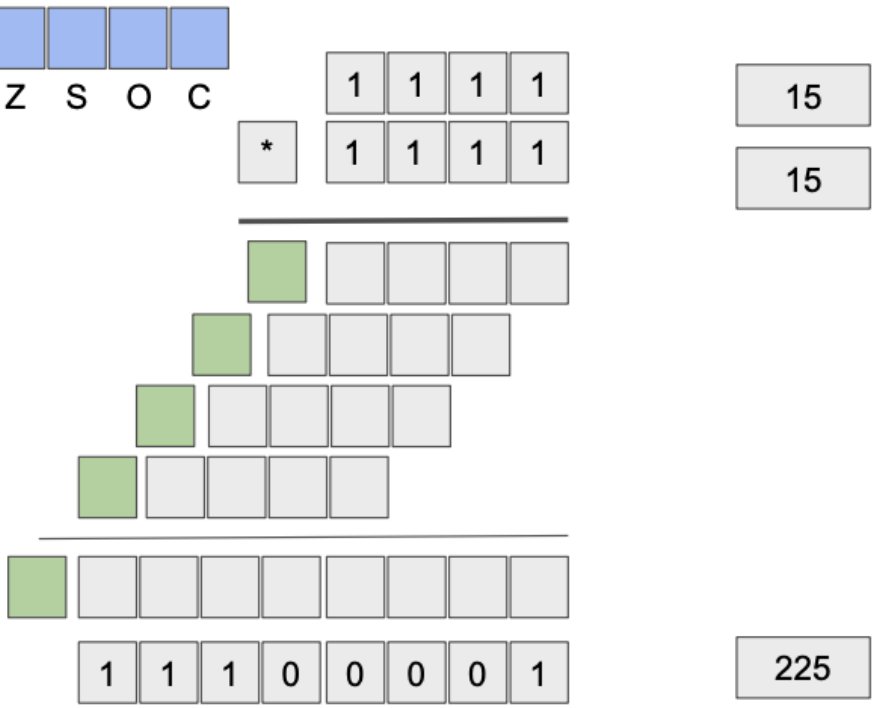
Add the following base 10 numbers together using binary addition. Show all your work, and make sure you also provide the appropriate values of the status bits. Your first step is to convert the base 10 numbers to binary. (Hint: be lazy, use gdb's print command.)

- 4 + 7
- 15 + 12



Binary Multiplication

Perform the binary multiplication of 15 x 15.



Scientific Notation

Convert the following real numbers to Scientific Notation

Decimal	Scientific Notation		
	Mantissa	Base	Exponent
3.14	3.14	x 10	0
10.10		x 10	
0.003765		x 10	
32000123.34		x 10	

Scientific Notation

Convert the following real numbers to Scientific Notation. Feel free to use gdb to convert the exponent to binary (e.g., print /t 4 → 100)

Binary	Scientific Notation		
	Mantissa	Base	Exponent
10101.1011	1.01011011	x 2	100 (4)
111.11101		x 2	
0.0010101		x 2	
10000101.011		x 2	

Base 10 Complements:

Provide the 10's and 9's complement for each of the following numbers with respect to 100,000.

Decimal	9's complement	10's complement*
54	99945	99946
45		
145		
255		
34		
195		

- Note the 10's complement can be computed by adding 1 to the 9's complement

Binary Complements:

Provide the 2's and 1's complement for each of the following numbers represented with 8 bits.
Free free to use gdb to obtain the binary representation of each number

Decimal	Binary	1's complement	2's complement*
54	0011 0110	1100 1001	1100 1010
45			
145			
255			
34			
195			

- Note the 2's complement can be computed by adding 1 to the 1's complement