Homework 1: EEL 4768.04 Due 9/13/19

Brandon Thompson 5517

September 8, 2019

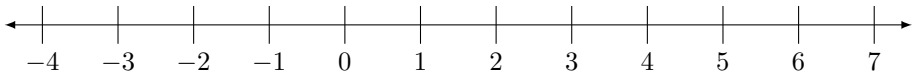
1. What is the largest unsigned 32-bit binary number?

   The largest possible unsigned binary number is given as:

   $$2^n - 1, \text{ where } n \text{ is the number of bits} \tag{1}$$

   Thus the largest 32-bit unsigned binary number is $2^{32} - 1 = 18,446,744,073,709,551,615$ or $1.844674407 \times 10^{19}$.

2. Draw a number line analogous to Figure 1.11 for 3-bit unsigned, two's complement and sign/magnitude numbers.



		Unsigned		000	001	010	011	100	101	110	111
100	101	110	111	000	001	010	011	Two's Complement			
	111	110	101	000 100	001	010	011	Sign/Magnitude			

3. The MIPS architecture has a register set that consists of 32-bit registers. Is it possible to design a computer architecture without a register set? If so, briefly describe the architecture, including the instruction set. What are advantages and disadvantages of this architecture over the MIPS architecture?

   Yes, it is possible to have a computer architecture without a register set. Instead the architecture would use memory in place of the register set. Instructions would be required to access the memory:
   `add 0x01, 0x02, 0x03`
   This would add the values of the memory location `0x02` and `0x03` and store the result in `0x01`.

   Advantages of this architecture is that there are fewer instructions because load and store operations are no longer needed. Disadvantages are that every operation would require a memory access. Meaning the processor would have to be slowed down or the memory smaller. Instruction size would have to be larger to access all of the memory or each instruction could only access a small number of memory addresses.