Name:

CSE 1400 Applied Discrete Mathematics

Spring 2014 Numbers

1. Using 3 digits the largest natural number that can be written is $999 = 10^3 - 1$.

   Generalize: Using n digits what is the largest natural number that can be written?

2. Using 8 bits the largest natural number that can be written is $(11111111)_2 = 2^8 - 1$.

   Generalize: Using n bits what is the largest natural number that can be written?

3. Generalize: Using an m numeral alphabet (e.g., $m = 10$ for decimal/digits, and $m = 2$ for binary/bits), what is the largest natural number that can be written using n numerals?

4. Pretend the memory address register of a computer is 64-bits wide. What, in theory, is the size of the address space that can be accessed?

5. The Internet Protocol (IP) is used to route traffic on the Internet. IPv6 uses 128-bit (16-byte) addresses.

   (a) What is the size of this address space?

   (b) Approximate your answer in decimal.

   (c) I just looked and the world population is 7,318,869,740 (and it grew by 92 as I wrote this). Let's just say, there are about 7.3 billion people on earth. Are there enough IPv6 addresses for them? For you?

Total Points: 0 Wednesday, January 8, 2014