Administrivia

- OH: Tuesday (and/or Thursday) 10-11, Soda Alcoves
- hw0 due next week, hw1 due soon after (so start learning C if you don't know it!)

Expectations

- Be respectful, courteous, etc. (come on, we're all college students...)
- Help your fellow classmates
- Have fun! ^__^

Number Representation

- A number $d_n...d_0$ in base B => $d_n \times B^n + ... + d_0 \times B^0$, each digit must be less than B
- For example: 354 in base 7 is $3 \times 7^2 + 5 \times 7^1 + 4 \times 7^0 = 186$ (in base 10)
- In 61c, we'll work with base 2 (binary), and base 16 (hexadecimal)

Number Bases

Decimal	Binary	Hex
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

IEC Prefixes

Name	Abbr	Factor
kibi	Ki	2^{10}=1,024
mebi	Mi	2^{20}=1,048,576
gibi	Gi	2^{30}=1,073,741,824
tebi	Ti	2^{40}=1,099,511,627,776
pebi	Pi	2^{50}=1,125,899,906,842,624
exbi	Ei	2^{60}=1,152,921,504,606,846,976
zebi	Zi	2^{70}=1,180,591,620,717,411,303,424
yobi	Yi	2^{80}=1,208,925,819,614,629,174,706,176

Exercises

1. Fill in the following table.

Decimal	Binary	Hex
29		
	0b1001 1111	
		0x21
		0x7F
	0b1101 0101	
255		

2. Scientists have discovered an ancient alien civilization on Mars! The aliens seem to have used an alphabet with 132 letters. What is the minimum number of bits required to represent all of the letters?

How many "wasted" combinations are there? What are some things we can use these bits for?

3. Convert the following numbers into IEC format.

2^{23}	2^{7}	2^{61}	2^{44}	2^{37}

4. Convert the following IEC numbers into a power of 2.

128 Ei	8 Ti	16	64 Ki	256 Pi

5. Bing's magical laptop has 3 TiB of memory (there are 3 Ti unique addresses). How many bits would Bing need to make full use of his memory?