Discussion [0b10] [2_{10}] [0x2]: Number Representation

Conversion

(a) Convert the following binary numbers into decimal.

11001 → _____–

1001001 → _____

(b) Convert the following decimal numbers into binary.

12 → _____

64 → _____

127 → _____

(c) Convert the following binary numbers into hex.

10011001 → _____

11110111 → _____

11000000111111111101110 → _____

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Limits

(a) What is the biggest number that can be represented with two decimal digits?

(b) What is the biggest number that can be represented with three binary digits?

(c) What is the biggest number that can be represented with four hexadecimal digits?

(d) How many different numbers can you represent using three binary digits?

More Conversion Practice

Fill in the blanks.

Decimal	Binary	Hexadecimal
12		C
5		5
11	1011	
25	11001	
	10001	11
	11011	1B
8		
	1110	
		1E
		49

Challenge Problems

(a) The original Pokemon are numbered 1-150. We want to store a binary encoding for all original Pokemon where each Pokemon has a binary code equivalent to their decimal number. How many bits do we need to use?

(b) What is the encoding for Pikachu (#25)?

(c) Ternary utilizes base 3 instead of base 2. For example, 10 in ternary is equivalent to 3 in decimal. Imagine that we wanted to store a ternary encoding for all 150 Pokemon where each Pokemon has a ternary code equivalent to their decimal number. What is the ternary encoding for Pikachu (#25)?