

# Discussion [0b10] [2] [0x2]

## Limits

- (a) What is the biggest number that can be represented with two decimal digits? **99**
- (b) What is the biggest number that can be represented with three binary digits? **0b111**
- (c) What is the biggest number that can be represented with four hexadecimal digits? **0xFFFF**

## Conversion

- (a) Convert the following binary numbers into decimal.

11001 → 25

1001001 → 73

- (b) Convert the following decimal numbers into binary.

12 → 0b1100

64 → 0b1000000

127 → 0b1111111

- (c) Convert the following binary numbers into hexadecimal.

10011001 → 0x99

11110111 → 0xF7

110000001111111111101110 → 0xCOFFEE

(d) Fill in the blanks.

Decimal	Binary	Hexadecimal
12	0b1100	C
5	0b101	5
11	1011	0x11
25	11001	
17	10001	11
27	11011	1B
8	0b1000	0x8
14	1110	0xE
30	0b11110	1E
73	0b1001001	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?

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

0b11001

(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)?

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