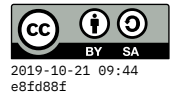


# Number systems and binary



## Practice problems

Solutions are available online<sup>1</sup>

1. Convert the base ten (decimal) number 83 into the following bases:

- base 4 : \_\_\_\_\_
- base 5 : \_\_\_\_\_
- base 6 : \_\_\_\_\_
- base 7 : \_\_\_\_\_

2. Convert the following numbers from the specified bases into base ten.

- $232_4 =$  \_\_\_\_\_
- $414_5 =$  \_\_\_\_\_
- $205_6 =$  \_\_\_\_\_
- $164_7 =$  \_\_\_\_\_

3. Convert the following base ten (decimal) numbers into binary.

- 6 = \_\_\_\_\_
- 18 = \_\_\_\_\_
- 51 = \_\_\_\_\_
- 63 = \_\_\_\_\_

4. Convert the following unsigned binary numbers into base ten.

- 1010 = \_\_\_\_\_
- 1101 = \_\_\_\_\_
- 1000 = \_\_\_\_\_
- 10001 = \_\_\_\_\_

5. What do all **odd** numbers have in common, when written in binary? (Hint: try writing the quantities 3, 5, 7, 9 in binary.)



<sup>1</sup><https://liucs.net/cs101f19/numbers-practice-sol.pdf>

6. Using 7-bit **signed two's complement** binary numbers, what is the **largest** positive number? What is the **most negative** number?

7. Convert the following 5-bit **signed two's complement** binary numbers into base ten.

• 01101 = \_\_\_\_\_

• 01111 = \_\_\_\_\_

• 10011 = \_\_\_\_\_

• 11111 = \_\_\_\_\_

8. Convert the following 16-bit binary number into octal and hexadecimal.

0 1 1 1 1 1 1 1 0 0 1 1 1 0 1 0

9. Convert the following **hexadecimal** numbers into binary:

• 9D = \_\_\_\_\_

• C4 = \_\_\_\_\_

• D05 = \_\_\_\_\_

• A17E = \_\_\_\_\_

10. Convert the following **octal** numbers into binary:

• 37 = \_\_\_\_\_

• 415 = \_\_\_\_\_

• 620 = \_\_\_\_\_

11. Add and verify the following **unsigned** binary numbers.

$$\begin{array}{r} 1\ 0\ 1\ 1\ 1\ 1 \\ +\ 1\ 1\ 1\ 0\ 1 \\ \hline \end{array}$$