To eliminate confusion between decimal numbers and binary numbers, we will put a subscript 2 after the number to mean binary. Because of the way the microcontroller operates, most of the binary numbers in this class will have 8, 16, or 32 bits. An 8-bit number is called a **byte**, and a 16-bit number is called a **halfword**. For example, the 8-bit binary number for 106 is

$01101010_2 = 0 \cdot 2^7 + 1 \cdot 2^6 + 1 \cdot 2^5 + 0 \cdot 2^4 + 1 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 = 64+32+8+2 = 106$

Help

BINARY TO DECIMAL CONVERTER

You have already learned how to convert from a binary number to its decimal representation. All you need to do is to calculate its value by multipling each coefficient by its placeholder values and summing all of them together. If you want to practice, Choose an 8-digit binary number. Try to calculate the decimal representation. Then type the number in the following field and click "convert" to check your result.

11110000 **Convert**

Decimal value = $1 * 2^7 + 1 * 2^6 + 1 * 2^5 + 1 * 2^4 + 0 * 2^3 + 0 * 2^2 + 0 * 2^1 + 0 * 2^0$
Decimal value = 128 + 64 + 32 + 16 + 0 + 0 + 0 + 0 = 240

DECIMAL TO BINARY CONVERTER

There are a few techniques for converting decimal numbers to binaries. One of them is consecutive divisions. We start by dividing the decimal number by 2. Then we iteratively divide the result (the qoutient) by 2 until the answer is 0. The equivalent binary is formed by the remainders of the divisions. The last remainder found is the most significant digit. Enter a number between 0 and 255 in the following field and click convert to see an example. Try to convert a decimal number to binary.

49 **Convert**

49/2 = 24	remainder = 1
24/2 = 12	remainder = 0
12/2 = 6	remainder = 0
6/2 = 3	remainder = 0
3/2 = 1	remainder = 1
1/2 = 0	remainder = 1

The binary equivalent = 00110001

CHECKPOINT 2.1

What is the numerical value of the 8-bit binary number 11111111_2?

Hide Answer

Add the powers of 2 for each digit that is 1

$1*2^7+1*2^6+1*2^5+1*2^4+1*2^3+1*2^2+1*2^1+1*2^0 = 255$

Help

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