

Exercises

1. Translate the following hexadecimal numbers to binary.
0x0, 0x10, 0xF, 0x1F, 0xA4, 0xFF
2. Find the bitwise and, or and xor of the following:
 - a) 0xC6 with 0x35
 - b) 0x19 with 0x24
 - c) 0xD3 with 0xC7
 - d) 0x17 with 0xFF
3. Find the 1's complement of the following:
0xC6, 0x35, 0xD3 and 0xC7.
4. In this question & is bitwise and, | is bitwise or, ^ is bitwise xor, and ! is 1's complement. a is any given two digit hexadecimal number. Explain why each of the following identities holds.
 - a) $0xFF \& a = a$. (0xFF is the identity for AND)
 - b) $0xFF | a = 0xFF$. (0xFF is the absorbent for OR)
 - c) $0xFF \wedge a = !a$
 - d) $0 \& a = 0$. (0 is the absorbent for AND)
 - e) $0 | a = a$. (0 is the identity for OR)
 - f) $0 \wedge a = a$. (0 is the identity for XOR)
 - g) $a \wedge a = 0$ (a is its own inverse under XOR)
 - h) For any three two digit hexadecimal numbers a, b and c:
If $a \wedge b = c$ then $a \wedge c = b$.
5. Write a program that counts the number of bits set in an integer. For example, the number 5 (decimal), which is 0000000000000101 (binary), has two bits set.
6. Write a program that takes a 32-bit integer (long int) and splits it into eight 4-bit values. (Be careful of the sign bit.)
7. Write a program that will take the bits in a number and shift them to the left end. For example, 01010110 (binary) would become 11110000 (binary).