



Name: _____

Lab Section: _____

Part I – decimal to binary (unsigned), including fractions

References: ECOA2e Section 2.3 and ECOA2e Chapter 2 slides 6-10, 18-24

For the decimal-to-binary conversions in this section, use either the subtraction method or the division/multiplication methods described in Chapter 2 of your ECOA2e text. Show all your work, either on the back of this page or on an attached separate sheet.

1. [0 points] Write down all the powers of two from zero (“1”) to 16 (“65,536”).
2. [2 points] Convert 25_{10} decimal to 11001_2 binary (see ECOA2e Chapter 2 slide 8).
3. [3 points] Convert 147_{10} decimal to 10010011_2 binary (see ECOA2e page 43).
4. [2 points] Convert 0.75_{10} to 0.11_2 binary (see ECOA2e Chapter 2 slide 19).
5. [3 points] Convert 0.8125_{10} to 0.1101_2 binary (see ECOA2e Chapter 2 slide 21).

Part II – binary to octal (base 8) and hexadecimal (base 16)

References: ECOA2e Sections 2.2, 2.3.3 and ECOA2e Chapter 2 slides 25-27.

See ECOA2e Section 2.3 p.41 Table 2.1 for the sixteen four-bit binary bit patterns for hexadecimal “digits” 0 through 9 and A through F. Note that in hex instead of writing 10 through 15 we use the hex “digits” A through F. (See ECOA2e Chapter 2 slide 26.)

When converting from binary to octal or hex digits, always start grouping binary bits from the right of the binary number. If you run out of bits for the last group of bits on the left, assume the leftmost missing bits are zero, e.g. treat a left-over 11_2 as 011_2 (when converting to octal) or as 0011_2 (when converting to hexadecimal).

6. [0 points] Write down the sixteen four-bit patterns for the hex digits 0, ..., 9, A, ..., F
7. [2 points] Convert the following binary value to octal (base 8) by using groups of three bits, starting from the right. *Hint: Your answer will have eight octal digits and the rightmost octal digit will be “0”:* $110011101010100001111000_2$

8. [2 points] Convert the following binary to hexadecimal (base 16) by using groups of four bits, starting from the right. *Hint: Your answer will have eight hex digits and the rightmost hex digit will be “A”:* $1110110100111001110000000011010_2$

9. [2 points] Convert the following binary to hexadecimal. *Hint: Your answer will have eight hex digits, all different:* $101100001001011111001001110110_2$
