

COMP 122/L
Summer 2022

Number Representation and Conversion

1.) What is 42 (decimal) in binary?

$$42 \% 2 = 0$$

$$42 / 2 = 21$$

$$21 \% 2 = 1$$

$$21 / 2 = 10$$

$$10 \% 2 = 0$$

$$10 / 2 = 5$$

$$5 \% 2 = 1$$

$$5 / 2 = 2$$

$$2 \% 2 = 0$$

$$2 / 2 = 1$$

$$1 \% 2 = 1$$

$$1 / 2 = 0$$

101010

2.) What is 282 (decimal) in binary?

$$282 \% 2 = 0$$

$$282 / 2 = 141$$

$$141 \% 2 = 1$$

$$141 / 2 = 70$$

$$70 \% 2 = 0$$

$$70 / 2 = 35$$

$$35 \% 2 = 1$$

$$35 / 2 = 17$$

$$17 \% 2 = 1$$

$$17 / 2 = 8$$

$$8 \% 2 = 0$$

$$8 / 2 = 4$$

$$4 \% 2 = 0$$

$$4 / 2 = 2$$

$$2 \% 2 = 0$$

$$2 / 2 = 1$$

$$1 \% 2 = 1$$

$$1 / 2 = 0$$

100011010

3.) What is 1001 1101 (binary) in decimal? (the space in the middle is just to make this easier to read; this is equivalent to 10011101)

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

$$128 + 0 + 0 + 16 + 8 + 4 + 0 + 1 = 157$$

Note: the question assumes this number is NOT in two's complement. More on two's complement later.

4.) What is 1100 1000 0010 1111 0110 1001 0101 1010 in hexadecimal? (Hint: use a lookup table)

$$1100 = C$$

$$1000 = 8$$

$$0010 = 2$$

$$1111 = F$$

$$0110 = 6$$

$$1001 = 9$$

$$0101 = 5$$

$$1010 = A$$

$$0xC82F695A$$