Worksheet 10 Review

March 28, 2020

Question 1

a.

$$(165)_8 = 5 \cdot 8^0 + 6 \cdot 8^1 + 1 \cdot 8^2 \tag{1}$$
$$= 5 + 48 + 64 \tag{2}$$
$$= 53 + 64 \tag{3}$$
$$= 117 \tag{4}$$

b.

$$(B4)_16 = 4 \cdot 16^0 + 11 \cdot 16^1 \tag{1}$$
$$= 4 + (11 \cdot 16) \tag{2}$$
$$= 4 + 176 \tag{3}$$
$$= 180 \tag{4}$$

Question 2

a.

$$357 \div 2 = 178, \text{remainder } \mathbf{1},$$
$$178 \div 2 = 89, \text{remainder } \mathbf{0},$$
$$89 \div 2 = 44, \text{remainder } \mathbf{1},$$
$$44 \div 2 = 22, \text{remainder } \mathbf{0},$$
$$22 \div 2 = 11, \text{remainder } \mathbf{0},$$
$$11 \div 2 = 5, \text{remainder } \mathbf{1},$$
$$5 \div 2 = 2, \text{remainder } \mathbf{1},$$
$$2 \div 2 = 1, \text{remainder } \mathbf{0},$$
$$1 \div 2 = 0, \text{remainder } \mathbf{1}$$

Combining it together, the binary representation of 357 is $(101100101)_2$

b.

$$1 \cdot 2^0 + 0 \cdot 2^1 + 1 \cdot 2^2 = \frac{1 + 0 + 4}{8^0} = 5$$
$$0 \cdot 2^3 + 0 \cdot 2^4 + 1 \cdot 2^5 = \frac{0 + 0 + 32}{8^1} = 4$$
$$1 \cdot 2^6 + 0 \cdot 2^7 + 1 \cdot 2^8 = \frac{64 + 0 + 256}{8^2} = 5$$

Combining it together, the octal representation of $(101100101)_2$ is $(545)_8$.

c.

$$357 \div 16 = 22, \text{remainder } \mathbf{5},$$
$$22 \div 16 = 1, \text{remainder } \mathbf{5},$$
$$1 \div 16 = 0, \text{remainder } \mathbf{1},$$

Combining it together, the hexadecimal representation of 357 is $(155)_{16}$.

Question 3