MAT2440, Classwork38, Spring2025

ID:______Name:____

1. Theorem for Representation of Integers.

Name:
$$(281)_{10} = 2 \cdot 10^2 + 8 \cdot 10^1 + 1 \cdot 10^0$$

Let b > 1 be an integer. Then if n is a positive integer, it can be expressed uniquely in the form

$$n = a_k b^k + a_{k-1} b^{k-1} + \dots + a_1 b^1 + a_0 b^0,$$

where $k \ge 0$ is an integer, $a_0, a_1, \cdots, a_{k-1}, a_k$ are integers with $0 \le a_0, a_1, \cdots, a_{k-1} \le b$, and $0 < a_k \le b$.

We called this representation of n base \underline{b} expansion of \underline{N} , denoted by $\underline{(a_k a_{k+1} a_{k+2} a_{k$

- 2. Converting Decimals to Integers of Other Bases.
 - - $2\cancel{\checkmark} \div 8 = \text{quotient}$ with remainder $0 \Rightarrow 2\cancel{\checkmark} = 3 \times 8 + 0$.
 - $3 \div 8 = \text{quotient}$ with remainder $3 \rightarrow 3 = 0 \times 8 + 3$.

Therefore, we have

$$|2345 = 1534 \times 8 + 1$$

$$= (192 \times 6 + 7) \times 6 + 1 = 192 \times 8 + 7 \times 6 + 1$$

$$= (24 \times 6 + 0) \times 6^{2} + 7 \times 6^{4} + 1 = 24 \times 6^{3} + 0 \times 6^{2} + 7 \times 8^{4} + 1$$

$$= (3 \times 6 + 0) \times 6^{3} + 0 \times 6^{2} + 7 \times 6^{4} + 1$$

$$= 3 \times 6^{4} + 0 \times 6^{3} + 0 \times 6^{2} + 7 \times 6^{4} + 1 = 6^{9} = (3001) \cdot 8$$

(b) Find the hexadecimal expansion of $(117730)_{10}$.

117730
$$\rightleftharpoons$$
 16 \Rightarrow Q 7358 R \geq 7358 \rightleftharpoons 16 \Rightarrow Q 459 R 14 \Rightarrow E 459 \rightleftharpoons 16 \Rightarrow Q \leq 1 R 11 \Rightarrow B \Rightarrow 16 \Rightarrow Q \leq 1 R 12 \Rightarrow C \Rightarrow 16 \Rightarrow Q \Rightarrow 10 \Rightarrow

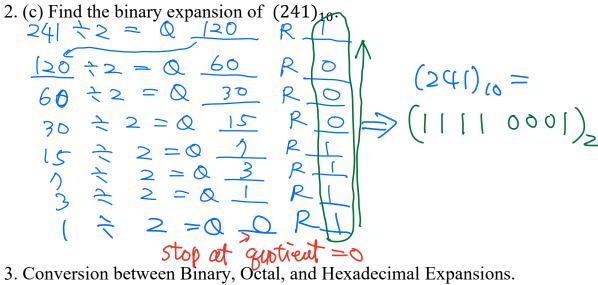


TABLE 1 Hexadecimal, Octal, and Binary Representation of the Integers 0 through 15.																
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Е	F
Octal	0	1	2	3	4	5	6	7	10	11	12	13	14	15	16	17
Binary	0	1	10	1[100	101	[10	Ш	1000	1001	1010	loll	1100	101	Шо	1111
V															1	
$(.2^{1} + 0.2^{\circ} = 2)$																

4. Convert $(11\ 1110\ 1011\ 1100)_2$ to octal and hexadecimal expansions.

