**Definition** For b an integer greater than 1 and n a positive integer, the base b expansion of n is

$$(a_{k-1}\cdots a_1a_0)_b$$

where k is a positive integer,  $a_0, a_1, \ldots, a_{k-1}$  are nonnegative integers less than  $b, a_{k-1} \neq 0$ , and

$$n = \sum_{i=0}^{k-1} a_i b^i$$

Notice: The base b expansion of a positive integer n is a string over the alphabet  $\{x \in \mathbb{N} \mid x < b\}$  whose leftmost character is nonzero.

Base $b$	Collection of possible coefficients in base $b$ expansion of a positive integer
Binary $(b=2)$	$\{0,1\}$
Ternary $(b=3)$	$\{0, 1, 2\}$
Octal $(b=8)$	$\{0, 1, 2, 3, 4, 5, 6, 7\}$
Decimal $(b = 10)$	{0,1,2,3,4,5,6,7,8,9}
Hexadecimal $(b = 16)$	$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F\}$
	letter coefficient symbols represent numerical values $(A)_{16} = (10)_{10}$ $(B)_{16} = (11)_{10}$ $(C)_{16} = (12)_{10}$ $(D)_{16} = (13)_{10}$ $(E)_{16} = (14)_{10}$ $(F)_{16} = (15)_{10}$