

Definition (Rosen p. 246) For b an integer greater than 1 and n a positive integer, the **base b expansion of n** is

$$(a_{k-1} \cdots a_1 a_0)_b$$

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

$$n = a_{k-1}b^{k-1} + \cdots + a_1b + a_0$$

Example:

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 $(A)_{16} = (10)_{10}$ $(B)_{16} = (11)_{10}$ $(C)_{16} = (12)_{10}$ $(D)_{16} = (13)_{10}$ $(E)_{16} = (14)_{10}$ $(F)_{16} = (15)_{10}$

Decimal $b = 10$	Binary $b = 2$	Octal $b = 8$	Hexadecimal $b = 16$
$(1401)_{10}$			
	$(1401)_2$		
		$(1401)_8$	
			$(1401)_{16}$

Algorithm for calculating integer part of log

```

1 procedure log( $n$ : a positive integer)
2    $r := 0$ 
3   while  $n > 1$ 
4      $r := r + 1$ 
5      $n := n \text{ div } 2$ 
6   return  $r$  { $r$  holds the result of the log operation}

```



