

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

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

Algorithm for converting from base b_1 expansion to base b_2 expansion:

Definition For b an integer greater than 1, w a positive integer, and n a nonnegative integer _____, the **base b fixed-width w expansion of n** is

$$(a_{w-1} \cdots a_1 a_0)_{b,w}$$

where a_0, a_1, \dots, a_{w-1} are nonnegative integers less than b and

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

Decimal $b = 10$	Binary $b = 2$	Binary fixed-width 10 $b = 2, w = 10$	Binary fixed-width 7 $b = 2, w = 7$	Binary fixed-width 4 $b = 2, w = 4$
$(20)_{10}$				

Definition For b an integer greater than 1, w a positive integer, w' a positive integer, and x a real number the **base b fixed-width expansion of x with integer part width w and fractional part width w'** is $(a_{w-1} \cdots a_1 a_0 . c_1 \cdots c_{w'})_{b,w,w'}$ where $a_0, a_1, \dots, a_{w-1}, c_1, \dots, c_{w'}$ are nonnegative integers less than b and

and

<p>3.75 in fixed-width binary, integer part width 2, fractional part width 8</p>	
<p>0.1 in fixed-width binary, integer part width 2, fractional part width 8</p>	