4 Integer Representation

4.1 write $(10001010111)_2$ in base 10

first we calculate $(1\cdot 2^{10} + 1\cdot 2^{6} + 1\cdot 2^{4} + 1\cdot 2^{2} + 1\cdot 2^{1} + 1\cdot 2^{0})$

$= (1024 + 64 + 16 + 4 + 2 + 1)$

$= \underline{\underline{1111}}$

$\underline{(10001010111)_2 = (1111)_{10}}$

4.2

first we convert $(1032113)_4$ to base 10

$1\cdot 4^6 + 3\cdot 4^4 + 2\cdot 4^3 + 1\cdot 4^2 + 1\cdot 4^1 + 3$

$4096 + 768 + 128 + 16 + 4 + 3 = 5015$

Then we find the binary expansion of $(5015)_{10}$

$5015 = 2507\cdot 2 + 1$
$2507 = 1253\cdot 2 + 1$
$1253 = 626\cdot 2 + 1$
$626 = 313\cdot 2 + 0$
$313 = 156\cdot 2 + 1$
$156 = 78\cdot 2 + 0$
$78 = 39\cdot 2 + 0$
$39 = 19\cdot 2 + 1$
$19 = 9\cdot 2 + 1$
$9 = 4\cdot 2 + 1$
$4 = 2\cdot 2 + 0$
$2 = 2\cdot 1 + 0$
$1 = 2\cdot 0 + 1$

$(1032113)_4 = (1001110010111)_2$