Answers to Exercises

§**I.1.**

1. $(112111)_3$.
2. $(260\frac{12}{126})_7$.
3. 10001100101; $1101\frac{1010}{1011}$.
4. MPJNS; LIKE$\frac{\text{IT}}{\text{WE}}$ (in other words, JQVXHJ=WE·LIKE+IT).
5. (a) 10.101101111110000; (b) C.SRO.
6. If $b^f - 1$ is a multiple of d, then the fraction can be written in the form $a/(b^f - 1)$, where a is an integer of at most f digits. Then use the formula for the sum of a geometric progression with initial term $a \cdot b^{-f}$ and ratio b^{-f}. Conversely, given a pure period-f expansion x, you find that $b^f x$ differs from x by an f-digit integer a, and this means that $x = a/(b^f - 1)$.
7. (a) $(\text{BAD})_{16}$; (b) no division is required: for example, to go from binary to hexadecimal simply start from the right and break off the digits in blocks of four; each four-tuple can be viewed as a hexadecimal digit (or replaced by one of the symbols 0—9, A—F).
8. (1) Look at the top and bottom bit and also at whether there's a borrow; (2) if both bits are the same and there is no borrow, or if the top bit is 1, the bottom bit is 0 and there is a borrow, then put down 0 and move on; (3) if the top bit is 1, the bottom bit is 0 and there is no borrow, then put down 1 and move on; (4) if the top bit is 0, the bottom bit is 1 and there is a borrow, then put down 0, put a borrow in the next column, and move on; (5) if both bits are the same and there is a borrow, or if the top bit is 0, the bottom bit is 1 and there is no borrow, then put down 1, put a borrow in the next column, and move on.