1.5 Let b = base

(a) $12 \times 4 = 52 \quad \rightarrow \quad (b + 2)\,4 = 5b + 2$

$$4b + 8 = 5b + 2$$

$$b = 6$$

(b) $75/3 = 26 \quad \rightarrow (7b + 5) = 3(2b + 6)$

$$7b + 5 = 6\text{b} + 18$$

$$b = 13$$

(c) $(2 \times b + 4) + (b + 7) = 4b$, so $b = 11$

1.6 $x^2 - 13x + 32 = 0$

$(x - 5)(x - 4) = 0$

$x^2 - (5 + 4)x + 5 \times 4 = x^2 - 13x + 32$

So, $5 + 4 = b + 3$ OR $5 \times 4 = 3b + 2$

$b = 6$ $\qquad b = 6$

1.9 **(a)** $(11010.0101)_2 = 16 + 8 + 2 + 0.25 + 0.0625$

$= (26.3125)_{10}$

(b) $(\text{A}6.5)_{16} = 10 \times 16 + 6 + 5 \times 0.0625$

$= (166.3125)_{10}$

(c) $(276.24)_8 = 2 \times 8^2 + 7 \times 8 + 6 + \dfrac{2}{8} + \dfrac{4}{64}$

$= 128 + 56 + 6 + 0.25 + 0.0625$

$= (190.3125)_{10}$

(d) $(\text{BABA.B})_{16} = 11 \times 16^3 + 10 \times 16^2 + 11 \times 16^1 + 10 + \dfrac{11}{16}$

$= 45056 + 2560 + 176 + 10 + 0.6875$

$= (47802.6875)_{10}$

(e) $10110.1101 = 16 + 4 + 2 + 0.5 + 0.25 + 0.0625 = (22.8125)_{10}$

1.10 **(a)** $1.10010_2 = 0001.1001_2 = 1.9_{16} = 1 + \dfrac{9}{16} = 1.563_{10}$

(b) $(1100.010)_2 = (C.4)_{16}$

$$= 12 + \frac{4}{16} = (12.25)_{10}$$

Shifted to left by 3 places.

1.11

```
          1010.1
110 | 111111
       110
        111          ⇒ (1010.1)₂
        110
          110
          110
            0
```

1.16 **(a)** $(CAD9)_{16}$

16's comp: $(3527)_{16}$

(b) $(CAD9)_{16} = (1100\ 1010\ 1101\ 1001)_2$

(c) 1100 1010 1101 1001

1's comp: 0011 0101 0010 0110

2's comp: 0011 0101 0010 0111

(d) 0011 0101 0010 0111

$= (3527)_{16}$

(a) and (d) both are same.

1.21 +9542 → 009542 +641 → 000641

–9542 → 990458 –641 → 999359

(a) (+9542) + (+641) ⇒ 009542

<u>+ 000641</u>

010183

(b) (+9542) + (–641) ⇒ 009542

1

+999359

008901

drop

(c) (–9542) + (+641) ⇒ 990458

+000641

991099 ⇒ –8901

(d) (–9542) + (–641) = 990458

+ 999359

989817 ⇒ –10183

1

drop

1.25 $(6514)_{10}$

(a) BCD : 0110 0101 0001 0100

(b) Excess 3 : 1001 1000 0100 0111

(c) 2421 : 1100 1011 0001 0100

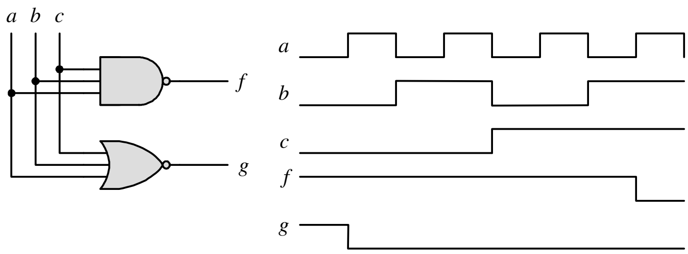
(d) 6311 : 1000 0111 0001 0101

1.27 For a deck with 52 cards, we need 6 bits ($2^5 = 32 < 52 < 64 = 2^6$). Let the msb's select the suit (e.g., diamonds, hearts, clubs, spades are encoded respectively as 00, 01, 10, and 11. The remaining four bits select the "number" of the card. Example: 0001 (ace) through 1011 (9), plus 101 through 1100 (jack, queen, king). This a jack of spades might be coded as 11 1010. (Note: only 52 out of 64 patterns are used.)

1.34 ASCII for decimal digits with even parity:

0	→	1 011 0000
1	→	0 011 0001
2	→	0 011 0010
3	→	1 011 0011
4	→	0 011 0100
5	→	1 011 0101
6	→	1 011 0110
7	→	0 011 0111

1.35 **(a)**



1.36