L5 practice problems

Answers:

1. a) $\underline{0}\ 001\ 0110 = 38_{10}$

   b) $\underline{0}\ 111\ 1111 = 127_{10}$

   c) $\underline{1}\ 000\ 0001 = -127_{10}$

   b) $\underline{1}\ 111\ 1111 = -1_{10}$

2. a) 2 numbers of opposite signs being added, there is no overflow.

   b) A subtraction that involves 2 numbers of opposite signs has a potential for overflow:

   $\underline{0}\ 1011000 - \underline{1}\ 0000010$
   $= \underline{0}\ 1011000 + \underline{0}\ 1111110$
   $= \underline{1}\ 1010110$

   Overflow because the correct result should be positive.

   c) An addition that involves 2 numbers of the same sign has a potential for overflow:

   $\underline{0}\ 1111111 + \underline{0}\ 0000010 = \underline{1}\ 000\ 0001$

   Sign bit of result = 1 indicates overflow because adding two positive numbers cannot produce a negative result.

   An overflow has occurred.

   d) A subtraction that involves 2 numbers of the same sign has no overflow.

3. (a) E2 + 42 = 24 (hex) – ignore carry out bit
Adding two numbers of opposite sign => no overflow

(b) 58 – 82 = 58 + 7E = D6 (hex)
58 and 7E are both positive but D6 is negative => overflow

(c) 7F + 02 = 81 (hex)
7F and 02 are both positive but 81 is negative => overflow

(d) E1 – FD = E1 + 03 = E4 (hex)
Subtracting two numbers of same sign => no overflow