Cpt S 260 Introduction to Computer Architecture

Homework 2 - Answers

- 1. $(1101\ 1110\ 1010\ 1101\ 1011\ 1110\ 1110\ 1111)_2 = (DEADBEEF)_{16}$
- 2. $(783)_{10}$ equivalent in Binary – $(0000\ 0011\ 0000\ 1111)_2$ Octal – $(01417)_8$ Hex – $(030F)_{16}$
- (-783)10 2's complement equivalent in Binary – (1111 1100 1111 0001)₂ Octal – (76361)₈ Hex – (FCF1)₁₆
- 4. (-783) + (-75) : 16-bit 2's complement arithmetic 1111 1100 1111 0001 (-783) (+)1111 1111 1011 0101 (-75)

------1111 1100 1010 0110 (-858)

Check answer in 4-digit 10's complement arithmetic: 10's complement representation of (-783) = 921710's complement representation of (-75) = 9925Hence, (9217 + 9925) = (19142)Ignore the leading 1 and take the 10s complement of 9142

Ignore the leading 1 and take the 10s complement of 9142 getting 858. So 9142 is the 10's complement of 858 and represents -858 which is the expected answer.

5. (-783 * - 56) in binary arithmetic :

Multiplication is to be done in 16-bit (use windows calculator). 16-bit multiplication results in an overflow (You don't even have to check with the calculator. Its purely logical that the number of bits just won't fit the answer)

Multiplying with 32-bit numbers gives the expected answer. $(1010\ 1011\ 0100\ 1000)_2$, which is $(43848)_{10}$

For 10's complement multiplication, we need at least 5 digits.

- 6. Double and add:
 - 0 | 0 | 1 | 1 1 | 3 0 | 6 0 | 12 1 | 25 Hence (11001)₂ = (25)₁₀
- 7. $(1000\ 0001)_{2} = (-127)_{10}$ $(1111\ 1111)_{2} = (-1)_{10}$ $(0101\ 0000)_{2} = (80)_{10}$ $(1110\ 0000)_{2} = (-32)_{10}$ $(1000\ 0011)_{2} = (-125)_{10}$