

American University of Beirut
Department of Electrical and Computer Engineering

EECE 320 – Digital Systems Design

Test 1

10-10-2011

Solution

Problem 1:

Convert the following numbers; stop at 4 digits after the binary point where needed.

Binary numbers should be written in 2's complement representation.

SHOW YOUR WORK.

$$86.42_{10} = (01010110,0110)_2$$

$$\begin{array}{rcl} 0,42 \times 2 & = & 0,84 \text{ --- } 0 \\ 0,84 \times 2 & = & 1,68 \text{ --- } 1 \\ 0,68 \times 2 & = & 1,36 \text{ --- } 1 \\ 0,36 \times 2 & = & 0,72 \text{ --- } 0 \end{array}$$

$$-52_{10} = (1001100)_2$$

$$52 = 0110100$$

↓
2's complement

$$765_{10} = (011101100101)_{BCD}$$

Add in hexadecimal:

$$7DA5 + 5B7E = D923$$

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$$82.53_{10} = (01010010.1000)_2$$

1010010

$$-45_{10} = (1010011)_2$$

$$\begin{aligned} 0.53 \times 2 &= 1.06 \text{ --- } \textcircled{1} \\ 0.06 \times 2 &= 0.12 \text{ --- } \textcircled{0} \\ 0.12 \times 2 &= 0.24 \text{ --- } \textcircled{0} \\ 0.24 \times 2 &= 0.48 \text{ --- } \textcircled{0} \end{aligned}$$

$$45 = 32 + 8 + 4 + 1 = 0101101$$

$$-45 = 1010011$$

$$843_{10} = (1000\ 0100\ 0011)_{BCD}$$

Add in hexadecimal:

$$7DA5 + 6C6F =$$

EA14

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$$79.35_{10} = (01001111,0101)_2$$

$$0,35 \times 2 = 0,7 \quad \text{---} \textcircled{0}$$

$$0,7 \times 2 = 1,4 \quad \text{---} \textcircled{1}$$

$$0,4 \times 2 = 0,8 \quad \text{---} \textcircled{0}$$

$$0,8 \times 2 = 1,6 \quad \text{---} \textcircled{1}$$

$$-37_{10} = (1011011)_2$$

$$37 = 0100101 \rightarrow 2's \text{ complement}$$

$$952_{10} = (100101010010)_{BCD}$$

Add in hexadecimal:

$$5AB7 + 6C6F = C726$$