CSE 3100 – Digital Logic
Professor Lawrence Orijuela
Homework 1 (Due TBD)

Instructions:

1. **Download this assignment as an editable word doc from Canvas.**
2. **Write your name and student ID.**
3. **For short answer questions (if any):**
    - **Write your answers in the spaces provided. Give yourself more space as needed.**
4. **For questions that require multiple steps, you can do one of two things:**
    - **Do your work on a piece of paper, take pictures, and paste them underneath the questions. Give yourself more space as needed.**
    - **Do your work on a piece of paper, take pictures, and submit the pictures as separate attachments when submitting on Canvas. Make sure they're properly labeled.**
5. **Export this doc with your name and answers as a PDF and submit it to canvas. (With other attachments, if applicable.)**
    - **Use this as your title: CSE3100_YourName_HW#**
    - **Example: CSE3100_BobSmith_HW1**

Name:Denny Le_____Student ID #:_____008531881_____Points:____/30_____

1. Convert the following decimal numbers into binary. Show your work.
    a. $(30)_{10}$

30 base 10 -> binary: 30/2 = 15r0, 15/2 – 7r1, 7/2=3r1, 3/2=1r1, 1/2 = 0r1

Start backwards: 1 1 1 1 0

    b. $(110)_{10}$

110/2=55r0,55/2=27r1, 27/2=13r1, 13/2=6r1, 6/2 = 3r0, 3/2 = 1r1, 1/2 = 0r1

Answer: 1 1 0 1 1 1 0

    c. $(259)_{10}$

259/2 = 129 r1, 129/2 = 64r1, 32r0 , 16r0 ,8r0 ,4r0 ,2r0 ,1r0 ,0r1

Answer :1 0 0 0 0 0 0 1 1

    d. $(500)_{10}$ = 250/r0, 125 r0, 62r1,31r0, 15r1, 7r1,3r1,1r1,0r1 = Answer 111110100

2. In Lecture, we show how to convert a decimal number into binary by successively dividing by 2. Another way to derive the answer is to construct the number by using powers of 2.

   For example, if we wish to convert the number $(23)_{10}$, then the largest power of 2 that is not larger than 23 is $2^4 = 16$. Hence, the binary number will have five bits and the most-significant bit is $b_4 = 1$.

   We then perform the subtraction $23 - 16 = 7$. Now, the largest power of 2 that is not larger than 7 is $2^2 = 4$. Hence, $b_3 = 0$ (because $2^3 = 8$ is larger than 7) and $b_2 = 1$. Continuing this process gives:

   $23 = 16 + 4 + 2 + 1$
   $= 2^4 + 2^2 + 2^1 + 2^0$
   $= 10000 + 00100 + 00010 + 00001$
   $= 10111$

   Using this method, convert the following decimal numbers into binary. Show your work.

   a. $(17)_{10} =$

      32 + 16 + 8 + 4 + 2 + 1 = Answer: 10001

      2^0+2^1+2^2+2^3+2^4

   b. $(33)_{10}$

      64 32 16 8 4 2 0

      Answer: 1 0 0 0 0 1

   c. $(67)_{10}$

      128 64 32 16 8 4 2 1

      1 0 0 0 0 1 1 <- Answer

   d. $(130)_{10}$

      128 64 32 16 8 4 2 1

      1. 0. 0. 0. 0 0 1 0

      Answer: 10000010

3. Convert the following binary numbers into decimal. Show your work.

a. $(110010)_2$

0 + 1x2^1+ 0 + 0 + 1x2^4 + 1 x 2^5

0 + 2 + 0 + 0 + 16 + 32 = 50.

Answer: 50

b. $(1100100)_2$

0 + 0 + 1x2^3 + 0 + 0 + 1x2^6 + 1x2^7

0 +0 + 4+ 0 + 0 + 32 + 64

Answer: 100

c. $(11001000)_2$

8 tuples

2^7+ 2^6 + 0 + 0 + 2x^3

128 + 64 + 8 = 200

Answer: 200

d. $(110010000)_2$

9 tuples:

256 + 128 +16 = 272 + 128 = 400

Answer: 400