

# ENGR xD52: HW b011

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Due October 2<sup>nd</sup> 11PM EST

This homework is to be done primarily alone. If you get stuck, you may consult anyone you like after putting in real effort. Annotate collaboration per problem.

Show all work.

As an alternative to doing this assignment, create a practice problem for each of the categories below. Generated practice problems will be put on the wiki.

## 1 Boolean Logic

1. Simplify the boolean equations to minimal 'Sum of Products' notation.
2. Rearrange equations to only use {NOT, NAND, NOR} gates.
3. Draw the reduced and rearranged equations' circuit diagrams.

1.1  $AB + AC + \bar{A}B$

1.2  $(AD + \bar{A}C)[\bar{B}(C + B\bar{D})]$

1.3  $\overline{A\bar{B}C + (\bar{A} + B + D)(AB\bar{D} + \bar{B})}$

## 2 Formats

Show the binary representation in the specified formats:

2.1 -d3 in I8

2.2 (110011 I3Q3) in I8Q8

2.3 (110011 U6) in I8Q8

## 3 Addition and Subtraction

1. Convert to binary. Indicate the format.
2. Perform the math in binary.
3. Indicate the result and the resulting format.
4. Convert to Decimal.

3.1 d17+d33.

3.2 d12-d15

3.3 d5.3125-d7.625

3.4 -h10.7 + o10.7

## 4 Multiplication

Perform the following multiplications in binary. Show sign extension (on the left), zero extension (on the right), and intermediate format for intermediate terms.

4.1  $(d5) * (d3)$

4.2  $(-d3) * (d6)$

4.3  $(11010010 \text{ I4Q4}) * (0101 \text{ I2Q2}) = \text{_____ I8Q8}$