HW4-1

1. (32%) Design a combinational circuit with unsigned four-bit binary input, xyzw (MSB:x, LSB:w), and unsigned four-bit binary output, ABCD (MSB:A, LSB:D). When the binary input is less than 0101, the binary output is 0011 greater than the input (for example, xyzw:0010 => ABCD:0101). When the binary input is greater than 1010, the binary output is 0101 less than the input (for example, xyzw:1110 => ABCD:1001). For other values of the binary input, the output equals the input.
   (a) Derive the truth table. (8%)
   (b) Derive the simplified Boolean expressions for A, B, C, D using maps. (16%)
   (c) Draw the related logic diagram. (8%)

2. (18%) Design a four-bit 2's complementer with simplified Boolean function and logic diagram. (The output generates the 2's complement of the input binary number.)

3. (10%) Design a 3x4 unsigned binary multiplier.

