1) Minimize the following Boolean functions:
   a) $F_1 = x'y' + yz + x'yz' + xy'z'$
   b) $F_2(x,y,z) = \sum(1,2,3,6,7)$
   c) $F_3(A,B,C,D) = \sum(0,2,4,5,6,7,8,10,13,15)$
   d) $F_4 = AB'C + B'C'D' + BCD + ACD' + A'B'C' + A'BC'D$
   e) $F_5 = wxy + yz + xy'z + x'y$
   f) $F_6(A,B,C,D,E) = \sum(1,5,8,10,12,13,14,15,17,21,24,26,31)$
   g) $F_7(A,B,C,D) = \sum(2,9,10,12,13) + d(1,5,14)$
   h) $F_8(A,B,C,D,E) = \sum(3,11,12,19,23,29) + d(5,7,13,27,28)$

2) Implement the following functions with only NAND gates:
   $F_9 = AB' + ABD + ABD' + A'C'D + A'BC'$,  $F_{10} = BD + BCD' + AB'C'D'$

3) Design and draw the schematic diagram of a circuit with four inputs (A, B, C, and D) and two outputs (Y and Z), which the output Y is “1” only when the input 4-bit BCD number “DCBA” is 0 or a multiple of 3, and the output Z is “0” only when the input number is a multiple of 4.

4) Design and draw the schematic diagram of a circuit which calculates the product of two 2-bit binary numbers.