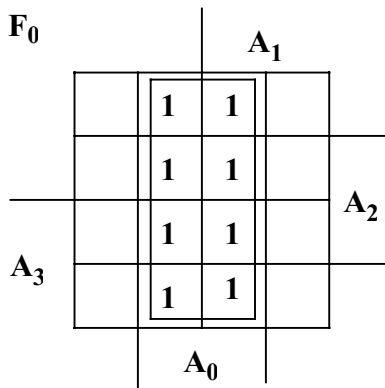
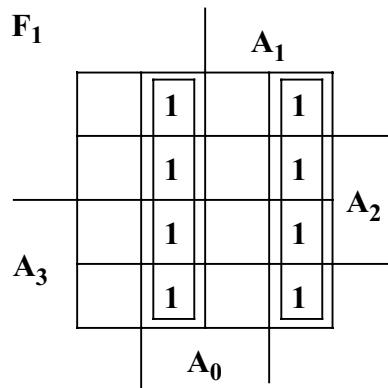
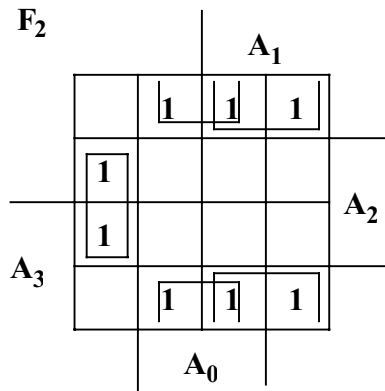
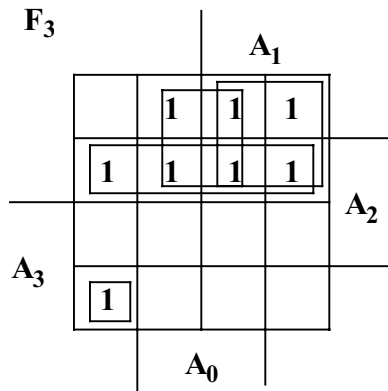


5. (15 points) Design a combinational circuit whose input is a four-bit number and whose output is the 2's complement of the input number.

$A_3A_2A_1A_0$	$F_3F_2F_1F_0$
0 0 0 0	0 0 0 0
0 0 0 1	1 1 1 1
0 0 1 0	1 1 1 0
0 0 1 1	1 1 0 1
0 1 0 0	1 1 0 0
0 1 0 1	1 0 1 1
0 1 1 0	1 0 1 0
0 1 1 1	1 0 0 1
1 0 0 0	1 0 0 0
1 0 0 1	0 1 1 1
1 0 1 0	0 1 1 0
1 0 1 1	0 1 0 1
1 1 0 0	0 1 0 0
1 1 0 1	0 0 1 1
1 1 1 0	0 0 1 0
1 1 1 1	0 0 0 1



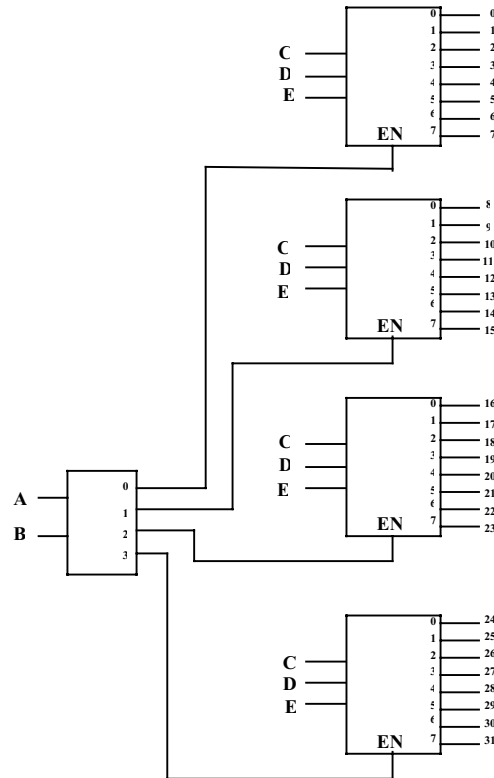
$$F_3 = \overline{A_3}A_2 + \overline{A_3}A_1 + \overline{A_3}A_0 + A_3\overline{A_2}\overline{A_1}\overline{A_0}$$

$$F_2 = \overline{A_2}A_0 + \overline{A_2}A_1 + A_2\overline{A_1}A_0$$

$$F_1 = A_1A_0 + \overline{A_1}A_0$$

$$F_0 = A_0$$

6. (10 points) Construct a 5-to-32-line decoder with four 3-to-8 decodes with enable input and one 2-to-4-line decoder.



7. (10 points) Construct a 7-to-1 line multiplexer with as many 2-to-1 line multiplexers as are needed.

