Questions in Chapters (1-3):

1) The representation of the binary number (111.0101)2 in Octal is

A. (7.24)8

B. (7.5)8

C. (7.05)8

D. (7.25)8

2) In octal, the twelve-bit two's complement of the hexadecimal number 3BE16 is

A. 16768

B. 16778

C. 61018

D. 61028

3) What is the Gray code value for the binary value 1011

A. 1110

B. 0110

C. 1101

D. 1111

4) On subtracting (010110)2 from (1011001)2 using 2's complement, we get _____

A. 0111001

B. 1100101

C. 0110110

D. 1000011

5) The sign magnitude representation of -9 is _____

A. 00001001

B. 10001001

C. 11111001

D. 10011001

6) If you are given a word of size n bits, the range of 2's complement of binary numbers is:

A. -2^{n+1} to $+2^{n+1}$

B. -2^{n-1} to $+2^{n+1}$

C. -2^{n-1} to $+2^{n+1}$

D. -2^{n-1} to $+2^{n-1}+1$

7) What is the BCD decimal number 29.25

A. 11101.010

B. 11101.100

C. 0010 1001. 010

D. 0010 1001. 0010 0101

8) Given that 86 students have registered in the ENCS234 course this summer, and each of these students should be assigned a unique n-bit binary code. The minimum value of n is

A. 5

B. 6

C. 7

D. 8

9) Which of the following functions is the constant 0 function?

A. $x' + xy$

B. $xy + y' + x'y$

C. $xy'(x' + y)$

D. $(x' + y)(xy)$

10) Without simplification, what is the dual form of the following expression:

$$(x + y'z')(wx'z + w'yz')$$

A. $(x + y'z')(wx'z + w'yz')$

B. $(x' + yz)(w'xz' + wy'z)$

C. $x.\ (y' + z') + (w + x' + z)(w' + y + z')$

D. $x'.\ (x + y) + (w' + x + z')(w + y' + z)$

11) Give the simplest form of $F = y(x + y) + (x + y)'z + yz$

A. $xy + x'z$

B. $xy + yz$

C. $xy + x'z + yz$

D. $xy + x'y'z + yz$

E. $y + x'z$

12) Which of the following is equal to $F(x, y) = \sum(m1, m2)$

A. $xy + x'y$

B. $xy' + x'y$

C. $(x + y')(x' + y)$

D. $(x' + y')(x + y)$

13) Given the Boolean function $F(x, y, z) = (x + y)(x + z)(x' + z')$. Express F as a sum-of-minterms

A. $F = \sum_m(2,3,5)$

B. $F = \sum_m(0,1,2,5,7)$

C. $\prod_M(3,4,6)$

D. $\prod_M(0,1,2,5,7)$

E. $F = \sum_m(3, 4, 6)$

14) Convert the following Sum of product (SoP)expression to an equivalent Product of Sum expression

$$ABC + AB'C' + AB'C + ABC' + A'B'C$$

A. $(A' + B' + C')(A + B + C')(A' + B + C)$

B. $(A + B + C)(A + B' + C)(A + B' + C')$

C. $(A' + B' + C')(A + B' + C)(A + B' + C)$

D. $(A + B + C)(A' + B + C')(A + B' + C)$

15) One of De Morgan's theorems states that . Simply stated, this means that logically there is no difference between: $(x + y)' = x'.y'$

A. a NOR and an AND gate with inverted inputs

B. a NAND and an OR gate with inverted inputs

C. an AND and a NOR gate with inverted inputs

D. a NOR and a NAND gate with inverted inputs

16) How many gates would be required to implement the following Boolean expression after simplification?

$$xy + x(x + z) + y(x + z)$$

A. 1 OR gate, 1 AND gate

B. 1 OR gate, 2 AND gates

C. 3 OR gates, 3 AND gates

D. 1 OR gate, 3 AAND gates

17) The NAND or NOR gates are referred to as "universal" gates because either:

A. can be found in almost all digital circuits

B. can be used to build all the other types of gates

C. are used in all countries of the world

D. were the first gates to be integrated

18) The number (77.1) 8 is equivalent to:

a. 3F.2

b. 3F.8

c. 3F.4

d. F3.2

e. None

19) The number 11111 in Two's complement is equivalent to

a. 31

b. -31

c. 1

d. -1

20) Given the function F(A,B,C) = ∏(0,2,4,6), the complement of F is

a. F` = ∑ (1,3,5,7)

b. F` = ∏(0,2,4,6)

c. F` = ∑ (0,2,4,6)

d. F`= ABC + A`B`

e. None

21) What is the simplified function AB+A(B+C)+B(B+C)

a. B+AC

b. A

c. B

d. B+C

e. None

22) Given the function F(a, b, c) = a(b′ + c). Express F as a product of Maxterms

a. F = ∑ (0,1,2,3,6)

b. F = ∏ (0,1,2,3,6)

c. F = ∏ (0,1,2,3,5)

d. F = ∏ (2,4,6)

23) The number (66.4) 8 is equivalent to:

a. 3F.2

b. 36.1

c. 36.4

d. 36.8

24) The number 11110 in Two's complement is equivalent to

a. 30

b. -30

c. -2

d. 2

e. None

25) Given the function F(A,B,C) = ∑ (0,2,4,6), the complement of F is

a. F` = ∑ (1,3,5,7)

b. F` = ∏(0,2,4,6)

c. F` = ∑ (0,2,4,6)

d. F`= ABC + A`B`

e. None

26) What is the result of Boolean expression simplification for (B ⊕ C) + (AB)' (A' + C')'

a. B ⊕ C

b. A ⊕ C

c. (B ⊕ C)'

d. (A ⊕ B)'

e. None

27) Given the function F(a, b, c) = a(b' + c). Express F as a product of Maxterms

a. F = ∑ (0,1,2,3,6)

b. F = ∏ (0,1,2,3,6)

c. F = ∏ (0,1,2,3,5)

d. F = ∏ (2,4,6)

e. None

28) Convert the following BCD number to decimal $(100000000011)_{BCD}$

a. 8003

b. 803

c. 1003

d. 103

29) Converting $(0111011.100)_2$ to base 16 yields which of the following results?

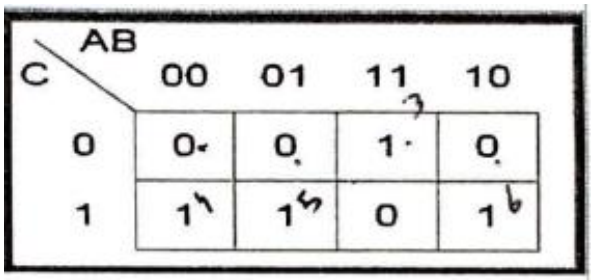
a. 3C.4

b. 3B.8

c. 73.4

d. 3B.4

30) Identify the function which generates the K-map shown



a. $F(A,B,C) = \sum (1,3,4,7)$

b. $F(A,B,C) = \prod (1,3,4,7)$

c. $F(A,B,C) = \sum (1,3,5,6)$

d. $F(A,B,C) = \prod (1,3,5,6)$

31) Converting $(310)_4$ to decimal answer is:

a. 130

b. 132

c. 52

d. 140

32) The base of the numbers in the operation (24 + 17 = 40) to be correct is

a. 9

b. 10

c.11

d. 12

33) The number $(161)_{10}$ is equivalent to:

a. $(11)_{16}$

b. $(AA)_{16}$

c. $(A1)_{16}$

d. None

34) The number $(55)_8$ is equivalent to:

a. $(2D)_{16}$

b. $(D2)_{16}$

c. $(B1)_{16}$

d. $(1B)_{16}$

35) The magnitude of $(80)_{10}$ is:

a. $(0000101)_2$

b. $(1010000)_2$

c. $(1100000)_2$

d. $(0010000)_2$

e. $(1011000)_2$

36) The magnitude of $(0.125)_2$ is:

a. $(0.010)_2$

b. $(0.011)_2$

c. $(0.111)_2$

d. $(0.100)_2$

e. $(0.001)_2$

37) The representation of the decimal number 129.33 in BCD is

a. $(1000\ 0001.0101)_{BCD}$

b. $(1000\ 0001.0001\ 0001)_{BCD}$

c. $(0001\ 0010\ 1001.\ 0011)_{BCD}$

d. $(0001\ 0010\ 1001.\ 0011\ 0011)_{BCD}$

e. $(0001\ 0010\ 1001.\ 0101)_{BCD}$

38) Using 2's complement binary representation, the result for 100000 –100011

a. 111101

b. 111100

c. 000011

d. 111011

e. Not possible, overflow

39) The simplest form of F = Y(X + Y) + (X+Y)'Z + YZ

a. F = 1

b. F = Y

c. F = X'Z

d. F = Y + X'Z

e. F = Y + YZ +X'Z

40) The dual of the function (x + y'z')(wx'z + w'yz') is:

a. x'.(y + z) + (w' + x + z').(w + y' + z)

b. x' + (y + z).(w' + x + z')+(w + y' + z)

c. x.(y' + z') + (w + x' + z).(w' + y + z')

d. x + (y' + z').(w + x' + z) + (w' + y + z')

e. x.(y + z) + (w + x + z).(w + y + z)

41) Given the Boolean function F(x,y,z) = (x+y)(x'+z)(y'+z'), the expression of F as a product-of-maxterms is

a. $F = \sum_m (2, 5)$

b. $F = \prod_M (2, 5)$

c. $F = \sum_m (0, 1, 3, 4, 6, 7)$

d. $F = \prod_M (0, 1, 3, 4, 6, 7)$

e. $F = \Pi_M (0,1,2,5,7)$

42) Shown to the right is the K-Map of the Boolean function F subject to the don't care conditions

F(A, B, C, D) = ∑m(0, 1, 2, 4, 6, 10, 12)

d(A, B, C, D) = ∑m(7, 13, 14, 15)

the minimum SOP expression of F is:

A. F = CD'+ BD'

B. F = BD' + A'B'C'

C. F = CD'+ BD' + A'B'C'

D. F = CD'+ CB +C'D'B+A'B'C'

AB \ CD	00	01	11	10
00	1	1	0	1
01	1	0	x	1
11	1	x	x	x
10	0	0	0	1

CD' + AB + A'D' + A'C'B'

43) In octal, the twelve-bit two's complement of the hexadecimal number $2AF_{16}$ is

A. 6522_8

B. 6251_8

C. 5261_8

D. 6521_8

2AF = 0010 1010 1111

1101 0101 0000

1+

1101 0101 0001 => 6521

44) Which of the following functions is the constant 1 function?

A. $x' + xy$

B. $xy + x' + xy'$

C. $xy'(x' + y)$

D. $(x' + y)(xy)$

$X(y+y') + X'$

$X(1) + X'$

$X + X' = 1$

45) Which of the following is equal to $F(x, y) = \sum(m_0, m_3)$

A. $xy + x'y'$

B. $x.\, y' + x'.\, y$

C. $(x + y')(x' + y)$

D. $(x' + y')(x + y)$

46) The following function has __ Essential prime implicants

A. 2

B. 4

C. 5

D. 8

AB \ CD	00	01	11	10
00			1	
01	1	1	1	
11		1	1	1
10		1		

47) Which function is the best for implementing the following function with two level NOR-OR form

A. $F = x'y'z' + xyz'$

B. $F = x'y + xy' + z$

C. $F = (x'y + xy' + z)'$

D. $F = [(x + y + z)(x' + y' + z)]'$

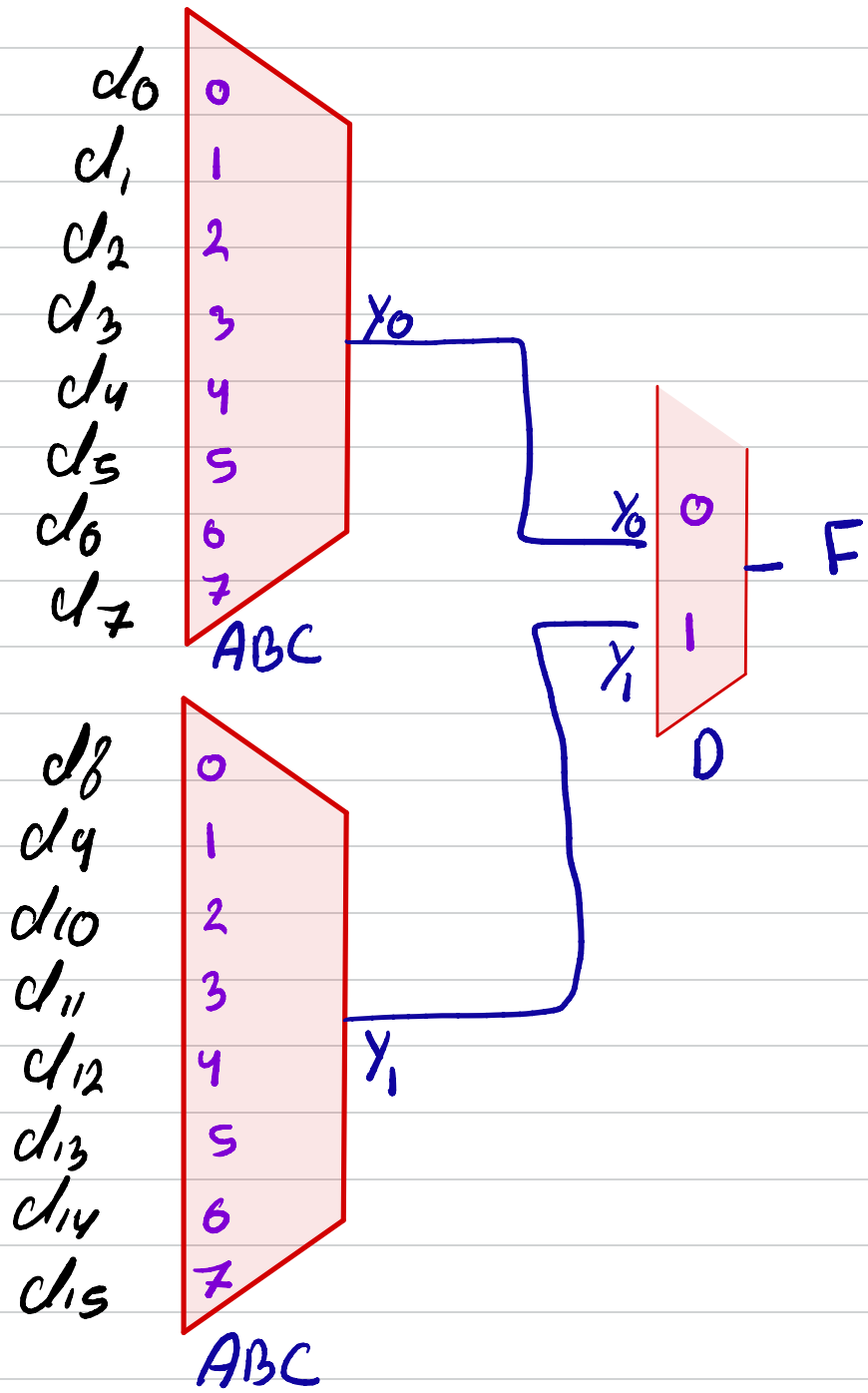
x \ yz	00	01	11	10
0	1			
1				1

Birzeit University
Department of Electrical &Computer Engineering
Digital Systems – ENCS 2340
Second Semester 2024/2025
Quiz #3
11.12.2024

Name: **Student Nr.:**

Construct a 16 × 1 multiplexer with two 8 × 1 and one 2 × 1 multiplexers.
Use block diagrams.

A	B	C	D	F
0	0	0	0	
0	0	0	1	
0	0	1	0	
0	0	1	1	
0	1	0	0	
0	1	0	1	
0	1	1	0	
0	1	1	1	
1	0	0	0	
1	0	0	1	
1	0	1	0	
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

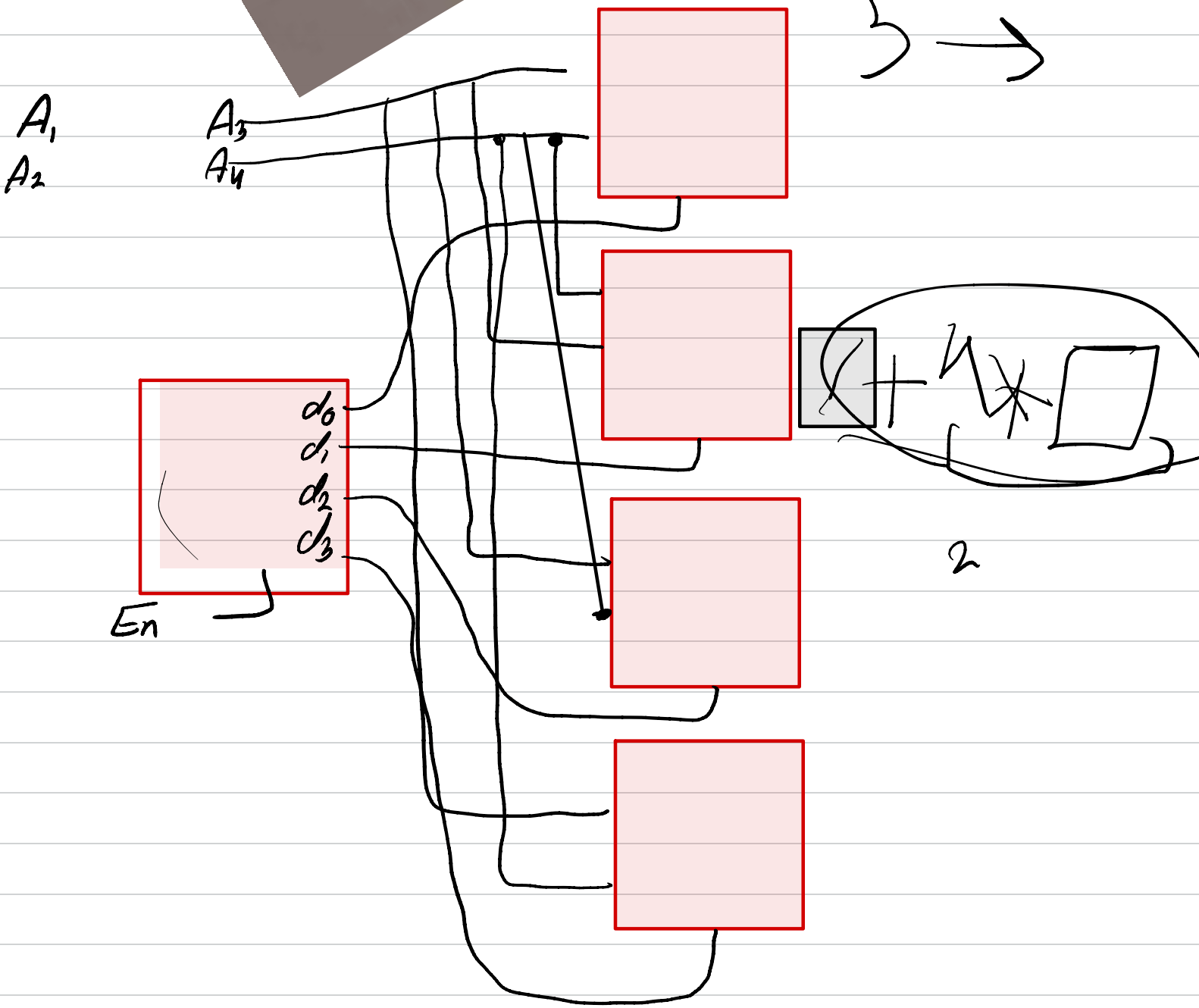


Construct a 4-to-16-line decoder with five 2-to-4-line decoders with enable.

5 : 2-4

4 → 1

5 →



48) Converting $(153)_{10}$ to base 8 yields which of the following results?

a. 107

b. 132

c. 701

d. 231

$153 \div 8$: 19 r 1; 2 r 3; 0 r 2 → 231

16 8 4 2 1

49) 10100 is the two's complement representation of:

a. +12 $-16+4=-12$

b. -12

c. -20

d. +20

50) Simplification of the Boolean expression AB + ABC + ABCD + ABCDE + ABCDEF yields which of the following results?

$= AB(1 + C + CD + \dots)$

$= AB \cdot 1$

$= AB$

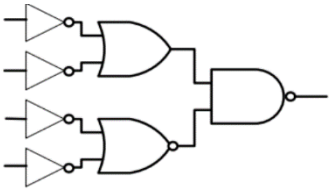
a. ABCDEF

b. AB

c. AB + CD + EF

d. A + B + C + D + E + F

51) The shown circuit can be implemented using a minimum of :



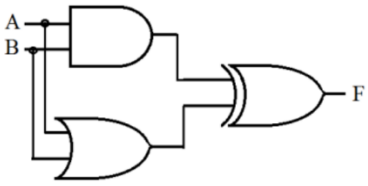
a. 3 NAND Gates

b. 4 NAND Gates

c. 5 NAND Gates

d. 4 NAND Gates and 1 NOR Gate

52) What is the output of the following circuit?



a. AB

b. A+B

c. A'B'+AB

d. A'B+AB'

53) Identify the function which generates the K-map shown

a. $F(A,B,C) = \sum (0,2,4,7)$

b. $F(A,B,C) = \sum (1,3,5,6)$

c. $F(A,B,C) = \sum (3,4,5,6)$

d. $F(A,B,C) = (1,3,5,7)$