

CS2100 TERM TEST #1 ANSWER SHEET

AY2013/4 Semester 2

NAME:

/ 30

MATRIC. NO.:

U	0						
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A	0						
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TUTORIAL
GROUP:

TOTAL SCORE

Write your particulars above legibly using a **pen** (not pencil!). Ensure that your matriculation number is correct and complete (your matriculation number comes with a letter at the end). You may use pencil for your answers below.

1.

D

2.

B

Explanation and
comments from
page 3 onwards.

3.

B

4.

E

5.

C



I am ANDroid

6.

[3]

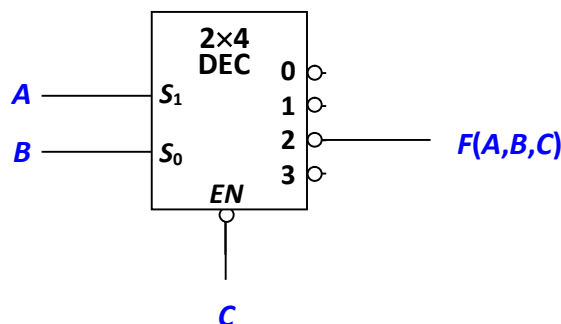
0	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0
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Decimal value = **16.75**

7.

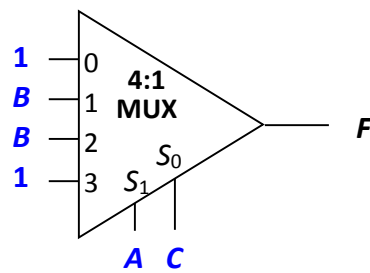
$$F(A,B,C) = A' + B + C$$

[3]



8.

[2]



9.

Simplified SOP expressions:

[2]

$$P = D + B' \cdot C$$

$$Q = D + B$$

10.

Simplified SOP expression:

[4]

$$F = A' \cdot C' \cdot D' + B \cdot C' \cdot D' + A \cdot B \cdot C + A' \cdot B' \cdot C \cdot D$$

Simplified POS expression:

$$F = (C+D') \cdot (A'+B'+C) \cdot (A+B'+D') \cdot (A+C'+D) \cdot (A'+B+C') \text{ or} \\ (C+D') \cdot (A'+B'+C) \cdot (A+B'+C') \cdot (A+C'+D) \cdot (A'+B+C') \text{ or} \\ (C+D') \cdot (A'+B'+C) \cdot (A+B'+C') \cdot (B+C'+D) \cdot (A'+B+D')$$

11.

[6]

$$TA = A' \cdot B + A \cdot B' \text{ or } A' \cdot B + A \cdot C' \rightarrow A \oplus B$$

$$JB = 1$$

$$KB = A$$

$$JC = A'$$

$$KC = A$$

Number of gates = 1

Explanation and Workings

2. $B + A \cdot B \cdot C \cdot D' \cdot E = B$

$$C \cdot D' \cdot F + C \cdot D \cdot F + C' \cdot F = (C \cdot D' + C \cdot D + C') \cdot F = F$$

$$B \cdot F + B' \cdot G \cdot H + F \cdot G \cdot H = B \cdot F + B' \cdot G \cdot H \text{ (consensus)}$$

3. 1 XNOR $B = B$

4.

A	B	C	F	G
0	0	0	1	1
0	0	1	0	0
0	1	0	0	0
0	1	1	1	0
1	0	0	0	0
1	0	1	0	1
1	1	0	1	1
1	1	1	1	1

5.

A	B	J	K	Command
0	0	0	0	No change
0	1	1	0	Set
1	0	1	0	Set
1	1	0	1	Clear

6. 4 1 8 6 0 0 0

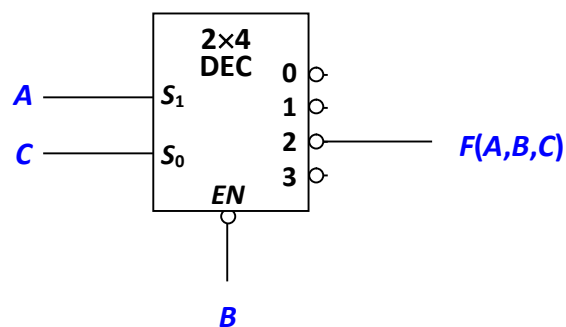
$$= 0 \quad 100 \, 0001 \, 1 \quad 000011000000\dots$$

$$+ 1.000011 \times 2^{(127-131)} = 1.000011 \times 2^4 = 10000.11_2 = \mathbf{16.75}_{10}$$

7. $F = A' + B + C$

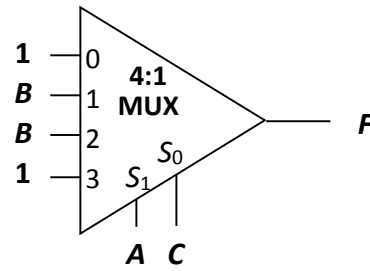
$$= C + (A \cdot B)'$$

Alternative answer:

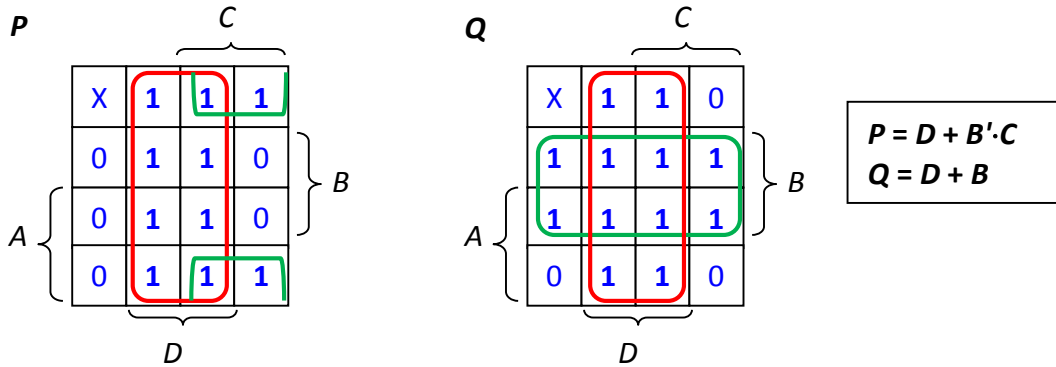


8.

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

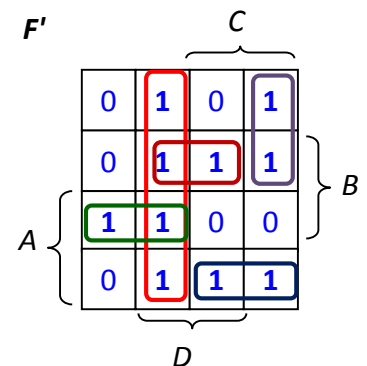
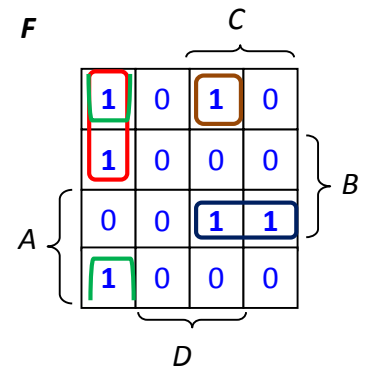


9.



10.

A	B	C	D	S ₃	S ₂	S ₁	S ₀	F
0	0	0	0	0	0	1	1	1
0	0	0	1	0	1	0	0	0
0	0	1	0	0	1	0	1	0
0	0	1	1	0	1	1	0	1
0	1	0	0	0	1	1	1	1
0	1	0	1	1	0	0	0	0
0	1	1	0	1	0	0	1	0
0	1	1	1	1	0	1	0	0
1	0	0	0	1	0	1	1	1
1	0	0	1	1	1	0	0	0
1	0	1	0	1	1	0	1	0
1	0	1	1	1	1	1	0	0
1	1	0	0	1	1	1	1	0
1	1	0	1	0	0	0	0	0
1	1	1	0	0	0	0	1	1
1	1	1	1	0	0	1	0	1

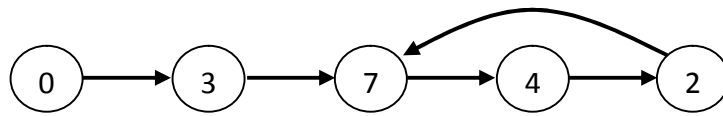


$$F = A' \cdot C' \cdot D' + B \cdot C' \cdot D' + A \cdot B \cdot C + A' \cdot B' \cdot C \cdot D$$

$$F' = C' \cdot D + A \cdot B \cdot C' + A' \cdot B \cdot D + A' \cdot C \cdot D' + A \cdot B' \cdot C \text{ or } C' \cdot D + A \cdot B \cdot C' + A' \cdot B \cdot C + A' \cdot C \cdot D' + A \cdot B' \cdot C$$

$$F = (C+D') \cdot (A'+B'+C) \cdot (A+B'+D') \cdot (A+C+D) \cdot (A'+B+C) \text{ or } (C+D') \cdot (A'+B'+C) \cdot (A+B'+C') \cdot (A+C+D) \cdot (A'+B+C) \text{ or } (C+D') \cdot (A'+B'+C) \cdot (A+B'+C') \cdot (B+C+D) \cdot (A'+B+D')$$

11.



Present state			Next state			Flip-flop inputs				
A	B	C	A ⁺	B ⁺	C ⁺	TA	JB	KB	JC	KC
0	0	0	0	1	1	0	1	X	1	X
0	0	1	X	X	X	X	X	X	X	X
0	1	0	1	1	1	1	X	0	1	X
0	1	1	1	1	1	1	X	0	X	0
1	0	0	0	1	0	1	1	X	0	X
1	0	1	X	X	X	X	X	X	X	X
1	1	0	X	X	X	X	X	X	X	X
1	1	1	1	0	0	0	X	1	X	1

$$TA = A' \cdot B + A \cdot B' \text{ or } A' \cdot B + A \cdot C' \rightarrow A \oplus B$$

$$JB = 1; KB = A$$

$$JC = A'; KC = A$$

1 additional gate (XOR gate for TA).

