Digital Logic - Assignment I

1. Convert the decimal number 123.4 to base 7, base 12, and base 16, retain maximum two digits after the radix point if necessary (no need to round).

234.25

A3.49

7B.66

2.Perform subtraction on the given unsigned numbers using the 10's complement of the subtrahend. Where the result should be negative, find its 10's complement and affix a minus sign.

The 10's complement of 2579 is $10000 - 2579 = 7421$, then add them, $4637 + 7421 = 12058$, then drop the carry 1, the answer is 2058.

The 10's complement of 1800 is $10000 - 1800 = 8200$, then add them, $0125 + 8200 = 8325$, with no carry 1, and the 10's complement of 8325 is $10000 - 8325 = 1675$, then the answer is -1675.

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The 10's complement of $2579$ is $10000 - 2579 = 7421$, then add them,
$4637 + 7421 = 12058$, then drop the carry 1, the answer is $2058$.
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The 10's complement of $1800$ is $10000 - 1800 = 8200$, then add them, $0125 + 8200 = 8325$, with no carry 1, and the 10's complement of $8325$ is $10000 - 8325 = 1675$, then the answer is $-1675$.
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3.Simplify the following Boolean expressions to a minimum number of literals using algebraic method:

yz'(z + xz') + (x' + z')(x'y + x'z)

Simplify the following expression:

yz'(z + xz') + (x' + z')(x'y + x'z)

1 = yzz'+xyz'z'+x'(x'+z')(y+z) ×

2 = xyz'+x'(y+z) ×

3 = xyz'+x'y(z+z')+x'z ×

4 = yz'(x+x')+x'z(y+1) ×

5 = yz'+x'z ×

Add simplification step (or press Enter)

Please add ' after subscript, e.g., Qt+1'

Allowed Variables:

x y z

Submit Reset

A(B + C) + BD'(A' + C)

Simplify the following expression:

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

1 = AB+AC+A'BD'+BCD' ×

2 = B(A+A'D'+CD')+AC ×

3 = B(A+D')+AC ×

4 = AB+AC+BD' ×

Add simplification step (or press Enter)

Please add ' after subscript, e.g., Qt+1'

Allowed Variables:

A B C D

Submit Reset

4.Express the Boolean expression bd' + acd' + ab'c + a'c' in sum of minterms form with Σ

Simplify the following expression:

bd' + acd' + ab'c + a'c'

1 = (a+a')b(c+c')d'+a(b+b')cd'+ab'c(d+d')+a'(b+b')c'(d+d') ×

2 = ∑(0,1,4,5,6,10,11,12,14) ×

Add simplification step (or press Enter)

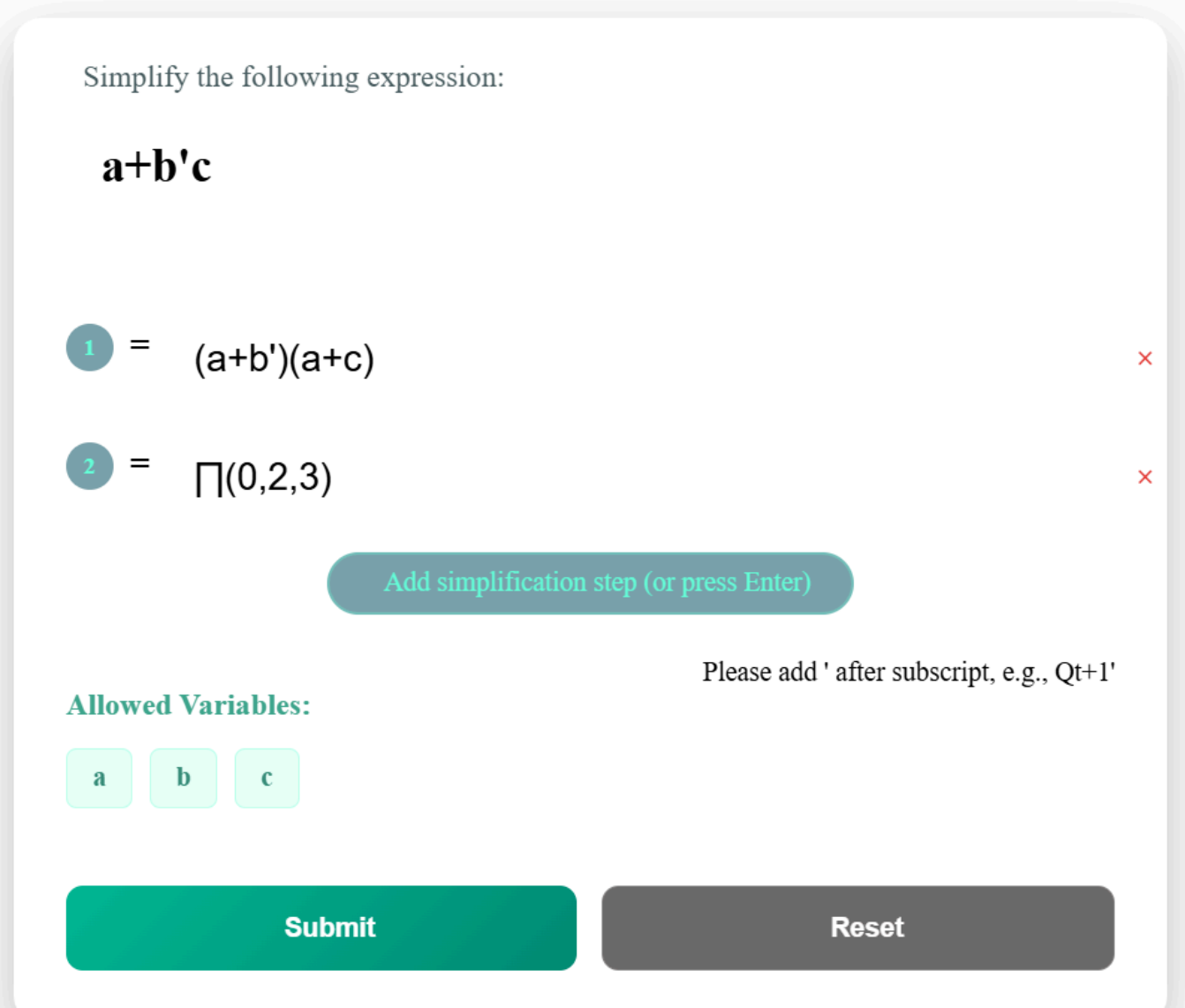
Please add ' after subscript, e.g., Qt+1'

Allowed Variables:

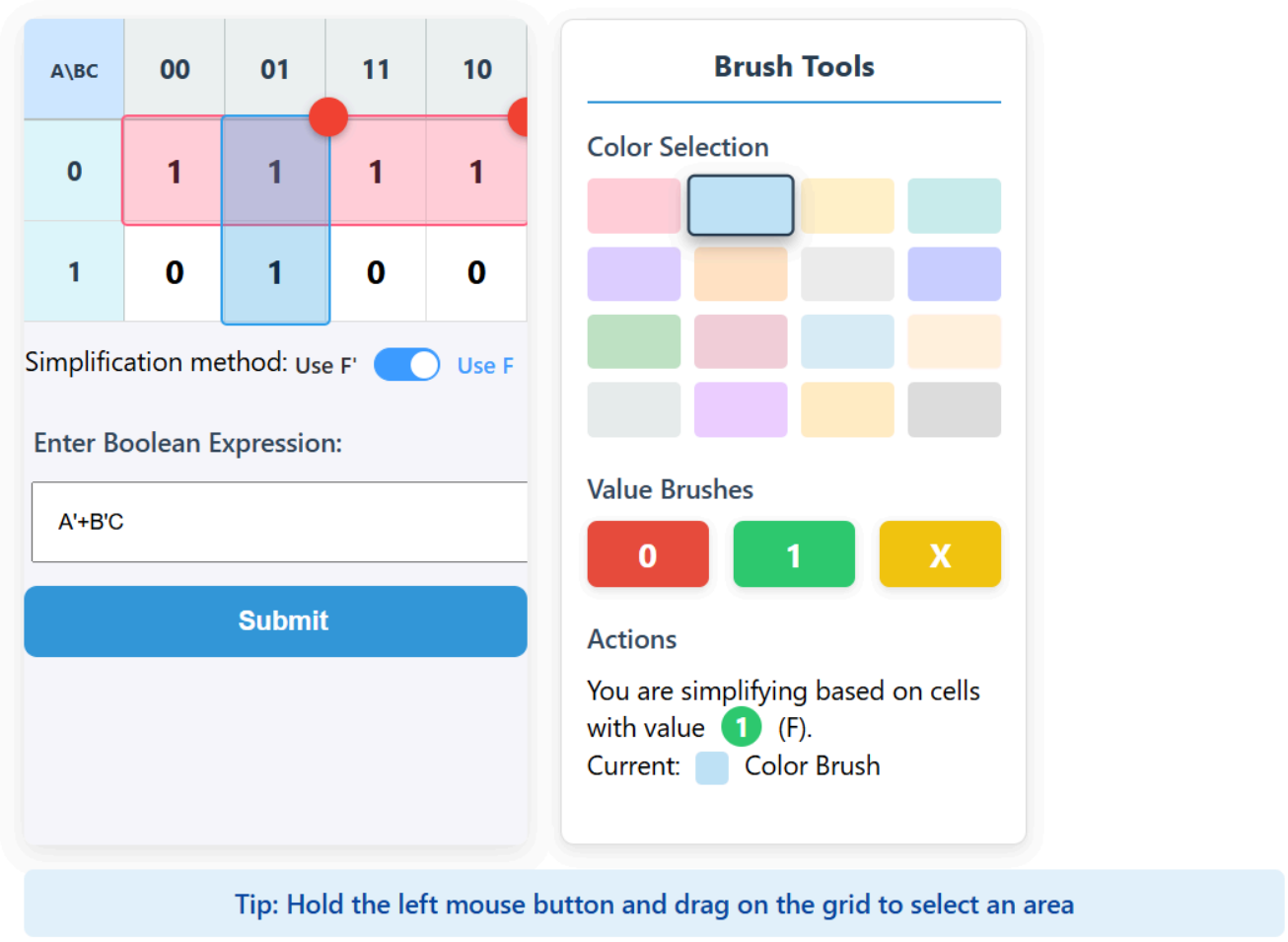
a b c d

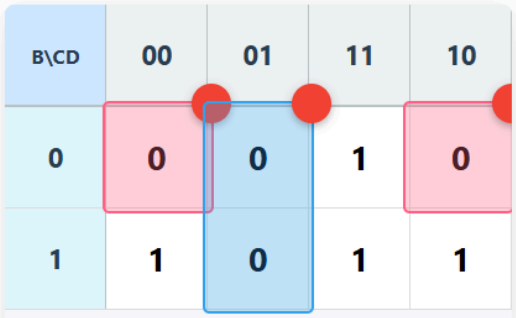
Submit Reset

5.Express the Boolean expression a+b'c in product of maxterms form with Π (The conversion with the help of sum of minterm form is not allowed)



6.Simplify the following three-variable Boolean functions algebraically to simplest standard form using K-map method:





Simplification method: Use F' Use F

Enter Boolean Expression:

(B+D)(C+D')

Submit

Brush Tools

Color Selection

Value Brushes

0 1 X

Actions

You are simplifying based on cells with value 0 (F').
Current: Color Brush

Tip: Hold the left mouse button and drag on the grid to select an area

7.For the following switch circuit:

Simplify the following expression:

1 = D((A'+B')C+AC')

Add simplification step (or press Enter)

Please add ' after subscript, e.g., Qt+1'

Allowed Variables:

A B C D

Submit Reset

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

1	1	1	0	0
1	1	1	1	0

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

Simplification method: Use F' Use F

Enter Boolean Expression:

A'CD+AC'D+B'CD

Submit

Brush Tools

Color Selection

Value Brushes

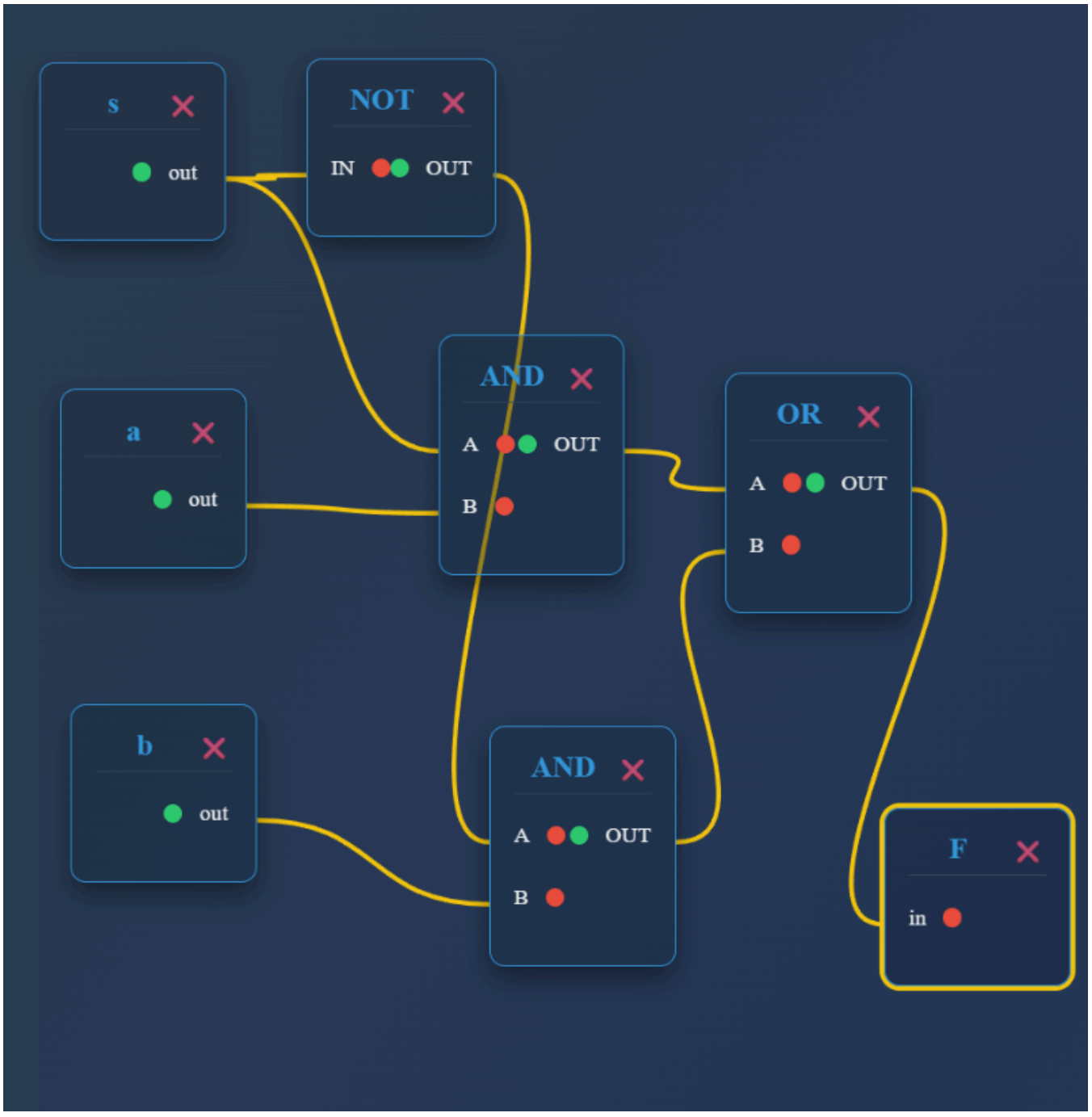
0 1 X

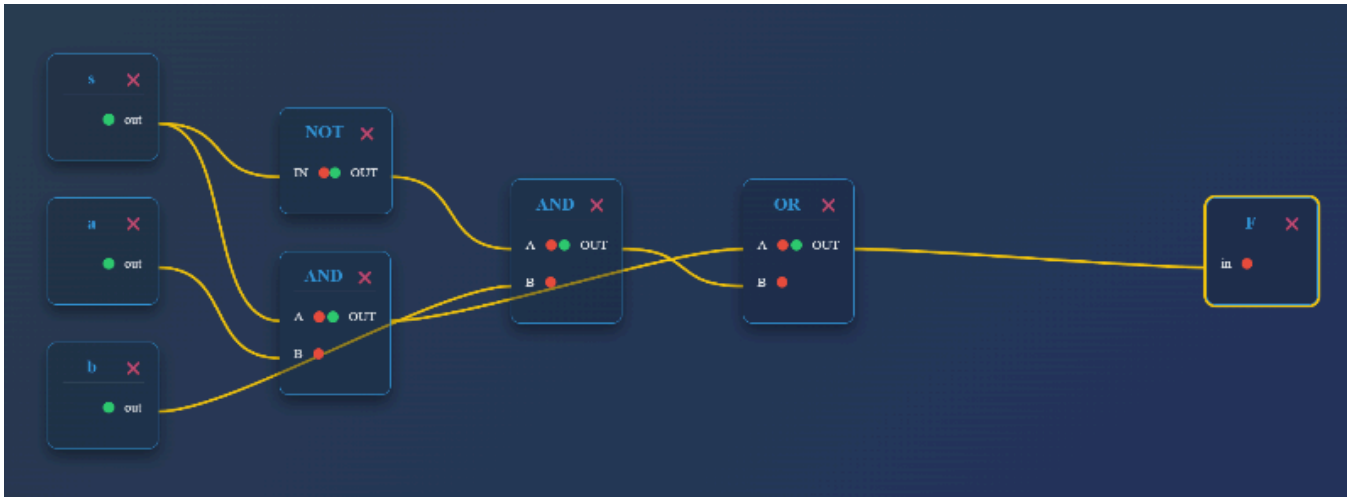
Actions

You are simplifying based on cells with value 1 (F).
Current: Color Brush

Tip: Hold the left mouse button and drag on the grid to select an area

8.Draw the circuit specified by the following HDL description




s
out
a
out
b
out
NOT
IN
OUT
AND
A
OUT
B
AND
A
OUT
B
OR
A
OUT
B
F
in