VE270 Quiz 2 2020.6.28 Candy Candies

Q1:

Question

(Answer online) Given logic equation F = (b'c' + de')f + ah, find the sum-of-product expression for G = F'.

$$
\begin{aligned}
G = F' &= \big((b'c' + de')f\big)'(ah)' \\
&= \big((b'c' + de')' + f'\big)(a' + h') \\
&= \big((b'c')'(de')' + f'\big)(a' + h') \\
&= \big((b + c)(d' + e) + f'\big)(a' + h') \\
&= (bd' + cd' + be + ce + f')(a' + h') \\
&= a'bd' + a'cd' + a'be + a'ce + a'f' + bd'h' + cd'h' + beh' + ceh' + f'h'
\end{aligned}
$$

Question

(Answer online) Given logic equation F = ac' + (b'd + ef')g, find the sum-of-product expression for G = F'.

$$
\begin{aligned}
G = F' &= (ac')'\big((b'd + ef')g\big)' \\
&= (a' + c)\big((bd + ef')' + g'\big) \\
&= (a' + c)\big((b'd)'(ef')' + g'\big) \\
&= (a' + c)\big((b + d')(e' + f) + g'\big) \\
&= (a' + c)(be' + bf + d'e' + d'f + g') \\
&= a'be' + a'bf + a'd'e' + a'd'f + a'g' + bce' + bcf + cd'e' + cd'f + cg'
\end{aligned}
$$

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Q1:

Question

(Answer online) Given logic equation F = ab' + (cd + e')' + f, find the sum-of-product expression for G = F'.

$G = F' = (ab')'(cd+e')f'$

$= (a'+b)(cd+e')f'$

$= a'cdf' + a'e'f' + bcdf' + be'f'$

Question

(Answer online) Given logic equation F = a'd + (bc' + e)f'g, find the sum-of-product expression for G = F'.

$G = F' = (a'd)'((bc'+e)f'g)'$

$= (a+d')((bc'+e)'+f+g')$

$= (a+d')((bc')'e'+f+g')$

$= (a+d')((b'+c)e'+f+g')$

$= (a+d')(b'e'+ce'+f+g')$

$= ab'e' + ace' + af + ag' + b'd'e' + cd'e' + d'f + d'g'$

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Q2:

Question

(Answer online) Simplify the following logic equation with Boolean algebraic theorems until minimal number of literals:

F = ac + bc + a'b'c + a

$$
\begin{aligned}
F &= ac+bc+a'b'c+a \\
&= a(c+1)+(b+a'b')c \\
&= a+(b+a')c \\
&= a+bc+a'c \\
&= a+c+bc \\
&= a+c
\end{aligned}
$$

Question

(Answer online) Simplify the following logic equation with Boolean algebraic theorems until minimal number of literals:

F = (ab)' + ac' + bc

$$
\begin{aligned}
F &= (ab)'+ac'+bc \\
&= a'+b'+ac'+bc \\
&= a'+c'+b'+c \\
&= 1
\end{aligned}
$$

Question

(Answer online) Simplify the following logic equation with Boolean algebraic theorems until minimal number of literals:

F = ab + ac + ab'c' + c'

$$
\begin{aligned}
F &= ab+ac+ab'c'+c' \\
&= a(b+c+b'c')+c' \\
&= a(b+c'+c)+c' \\
&= a+c'
\end{aligned}
$$

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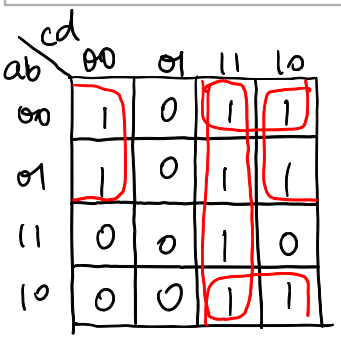
Q3:

Question

(Answer on paper) Simplify the following logic equation to the minimum sum-of-product form using K-map method:

F = a'd' + (a' + b'd' + d)c

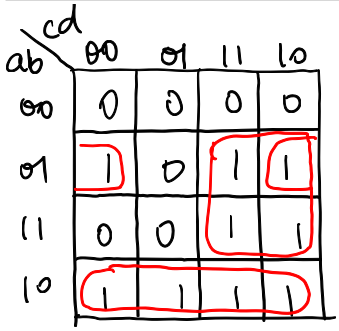


$F = a'd' + b'c + cd$

Question

(Answer on paper) Simplify the following logic equation to the minimum sum-of-product form using K-map method:

F = a'b(c + d') + a(b' + c) + a(b + d)c

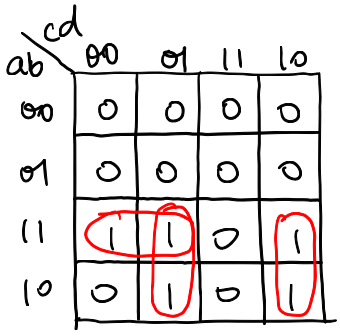


$F = a'bd' + bc + ab'$

Question

(Answer on paper) Simplify the following logic equation to the minimum sum-of-product form using K-map method:

F = a(b+c)d' + ac'(b + d)



$F = abc' + ac'd + acd'$

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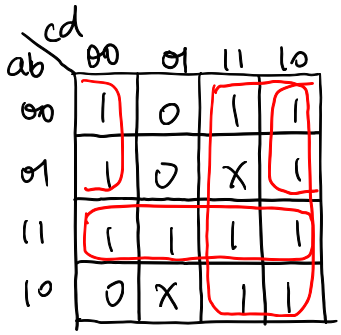
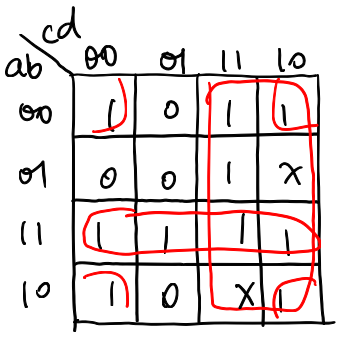
Q4: $F: 1011, 101x, 0x11, 1111$



$F = c + a'd' + ab.$

$F: 1011, 00x1, 101x, 1111$



$F = b'd' + c + ab$