Prime Implicants

For each Karnaugh maps below, circle the prime implicants. Then list each product term derived from the map indicating which are essential. You won't necessary need all lines. Finally, write the simplified expression.

Part	A
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•		3	\sim	3		prime implicant	essen	
_	1	1	1	1	$\left.\right\} \overline{\mathbf{C}}$		yes□ yes□	no \square
A	0	0	1	0			yes□	no 🗆
(1	1	1	0			yes□	no 🗆
A\{	0	1	1	0	$\left. \right\} \overline{\mathrm{C}}$		yes□ yes□	no \square
	$\stackrel{\smile}{\widetilde{\overline{D}}}$	I))	$\widetilde{\overline{D}}$	J		yes□	no 🗌

=(A,D,C,D)	F	(A,	B	C	D)	=
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Part B

	Ī	3	I	3		prime implicant	essen	tial?
(1	1	0	1	$\left.\right\} \overline{\mathbf{C}}$		yes□	no 🗆
$\overline{\mathbf{A}}$	1	0	1	1			yes□ yes□	no □
	1	0	0	1	$\left\{ \mathbf{C}\right\}$		yes□	no 🗆
A	1	1) }		yes□	no 🗆
	1		0	1]} C		yes□	no 🗆
	$\overline{\mathrm{D}}$	I)	$\overline{\mathrm{D}}$			yes□	no 🗌

$$F_{(A,B,C,D)} = \underline{\hspace{1cm}}$$

Part C

,	\sim \bar{I}	<u></u>	\sim I	3		prime implicant	essen	tial?
(0	0	0	1	$\overline{\mathbf{C}}$		yes□	no 🗌
$\overline{\mathbf{A}}$)		yes□	no 🗌
	0	1	1	1			yes□	no 🗌
(1	0	0	1			yes□	no 🗌
\mathbf{A}					\ \ \ -		yes□	no 🗆
	0	0	0	1	$\left.\right\}$ C		yes□	no 🗌
	~~~	$\searrow$	$\sim$	~~~				
	D	I	)	D			yes∟	no 🗀

 $F_{(A,B,C,D)} = \underline{\hspace{1cm}}$ 

Part D										
	I	3		3		prime implicant	essential?			
_(	1	0	0	1	$\left\{ \overline{C} \right\} = \overline{C}$		yes□ no □  yes□ no □			
$\overline{A}$	0	1	1	0			yes□ no□			
	1	1	1	1	$\left\{ \begin{array}{c} \mathbf{C} \end{array} \right\}$		yes \( \sigma \) no \( \sigma \)			
A	1	0	0	1	$\left\{ \overline{C} \right\}$		yes□ no□ 			
\[	~~~		$\sim$	~~~	] <i>)</i> -		yes□ no□			
	$\overline{\mathrm{D}}$	I	)	$\overline{\mathrm{D}}$	-		yes□ no□			
$F_{(A,B,C,D)} =$										
Part E	Ī	<u>.</u>	_ F	3		prime implicant	essential?			
/[					]>= -		yes□ no□			
$\overline{\mathbf{A}}$	1	0	1	1	$\left.\right \right\} \overline{\mathbf{C}}$		yes□ no□			
	1	0	1	1	$\left\langle \right\rangle_{\mathbf{C}}$		yes□ no□			
	0	0	1	0	) .		yes□ no□			
A	1	0	1	1	$\left\{ \overline{\mathbf{C}} \right\}$		yes□ no □  yes□ no □			
`[	~~~		~	~~~			_			
	$\overline{\mathrm{D}}$	I	)	$\overline{\mathrm{D}}$	-		yes□ no□			
$F_{(A,B,C,D)} = $										
I dit I	Ī	3	_ F	3		prime implicant	essential?			
/	1	1	0	1	$\left\{ \overline{\mathbf{C}} \right\}$		yes□ no□			
$\overline{A}$	1	1	U	1	\ \ \ .		yes□ no□			
	1	0	1	1	$\left\langle \right\rangle_{\mathbf{C}}$		yes□ no□			
	0	1	1	0	) .		yes□ no□			
A	1	1	1	0	$\left\{ \overline{\mathbf{C}} \right\}$		yes□ no□			
\		1		~~	] } •		yes□ no□			
	$\overset{\smile}{\overline{D}}$	I	)	$\overset{\circ}{\mathbf{D}}$	-		yes□ no□			
$F_{(A,B,C,D)}(SC)$	$F_{(A,B,C,D)}(SOP) = \underline{\hspace{1cm}}$									
$F_{(A,B,C,D)}(POS) = \underline{\hspace{2cm}}$										

**Part G** A four variable Karnaugh map contains all ones except for the entries  $A\overline{B}CD$  and ABCD which are zeros. What is the *simplified* logical expression in product of sums form?

 $F_{(A,B,C,D)} = \underline{\hspace{1cm}}$ 

Part H For the truth table below, complete the Karnaugh map below and identify the prime implicants. Then write the simplified expression. Be sure to factor out any common terms in your solution.

Α	В	С	Out
0	0	0	1
1	0	0	1
0	1	0	0
1	1	0	1
0	0	1	1
1	0	1	0
0	1	1	0
1	1	1	0

		$\bar{B}$		B			pri	me in	nplicant	essen	tial?
$\overline{A}$						_				yes□	no 🗌
{										yes□	no 🗌
A										yes□	no 🗆
	$\overline{}$		·	~~	l						
	$\overline{C}$	(	C	$\overline{C}$							

 $F_{(A,B,C,D)} = \underline{\hspace{1cm}}$