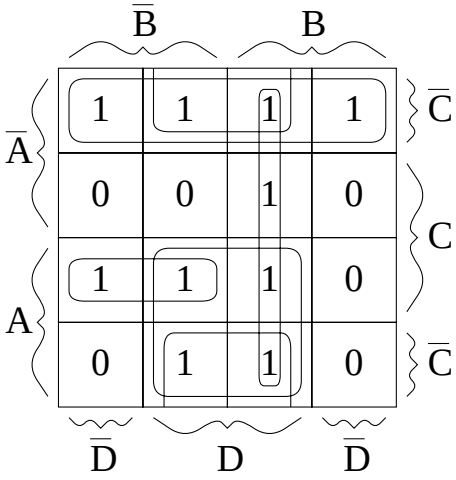
Prime Implicants

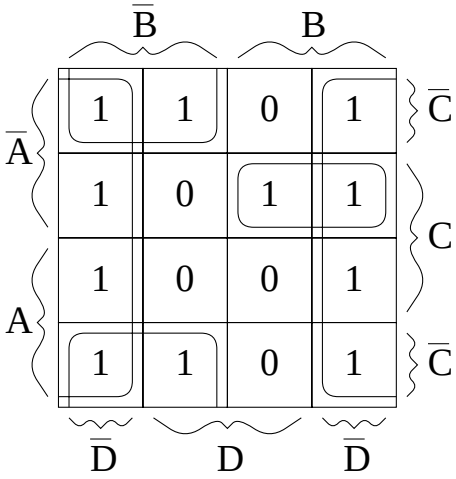
Part A



prime implicant	essential?
$\overline{A}\,\overline{C}$	yes☒ no☐
$B\,D$	yes☒ no☐
$A\,D$	yes☐ no☒
$\overline{C}\,D$	yes☐ no☒
$A\,\overline{B}\,C$	yes☒ no☐
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)} = \overline{A}\,\overline{C} + B\,D + A\,\overline{B}\,C + A\,D$$

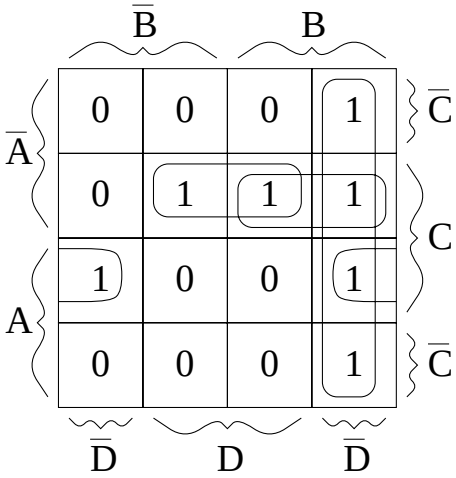
Part B



prime implicant	essential?
$\overline{D}$	yes☒ no☐
$\overline{B}\,\overline{C}$	yes☒ no☐
$\overline{A}\,B\,C$	yes☒ no☐
	yes☐ no☐
	yes☐ no☐
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)} = \overline{D} + \overline{B}\,\overline{C} + \overline{A}\,B\,C$$

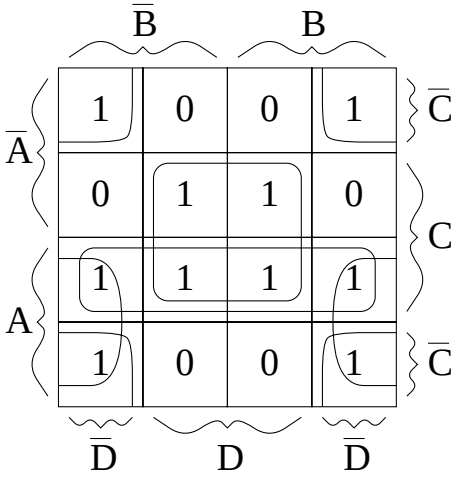
Part C



prime implicant	essential?
$B\,\overline{D}$	yes☒ no☐
$\overline{A}\,C\,D$	yes☒ no☐
$\overline{A}\,B\,C$	yes☐ no☒
$A\,C\,\overline{D}$	yes☒ no☐
	yes☐ no☐
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)} = B\,\overline{D} + \overline{A}\,C\,D + A\,C\,\overline{D}$$

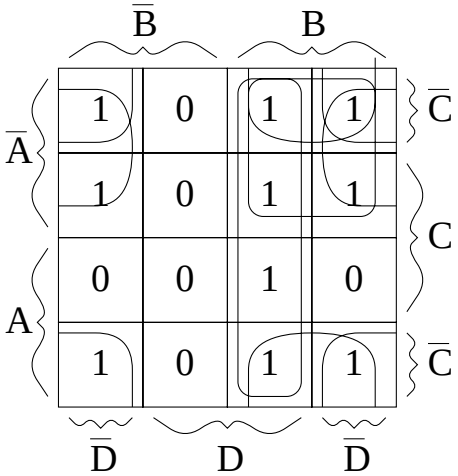
Part D



prime implicant	essential?
C D	yes☒ no☐
A C	yes☐ no☒
A $\overline{D}$	yes☐ no☒
$\overline{C}$ $\overline{D}$	yes☒ no☐
	yes☐ no☐
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)} = C\,D + \overline{C}\,\overline{D} + A\,C$$

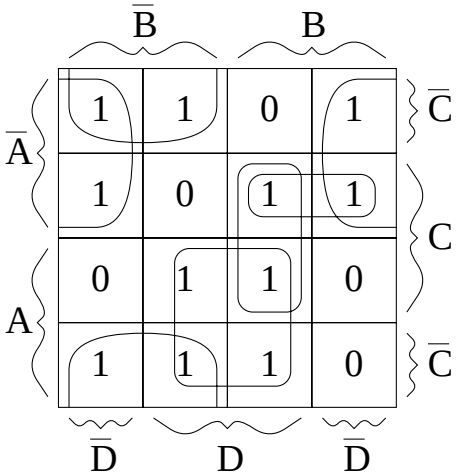
Part E



prime implicant	essential?
B D	yes☒ no☐
$\overline{A}$ B	yes☐ no☒
$\overline{A}$ $\overline{D}$	yes☒ no☐
B $\overline{C}$	yes☐ no☒
$\overline{C}$ $\overline{D}$	yes☒ no☐
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)} = B\,D + \overline{A}\,\overline{D} + \overline{C}\,\overline{D}$$

Part F



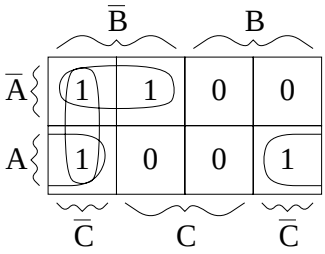
prime implicant	essential?
A D	yes☒ no☐
$\overline{B}$ $\overline{C}$	yes☒ no☐
$\overline{A}$ $\overline{D}$	yes☒ no☐
$\overline{A}$ B C	yes☐ no☒
B C D	yes☐ no☒
	yes☐ no☐
	yes☐ no☐

$$F_{(A,B,C,D)}(SOP) = A\,D + \overline{B}\,\overline{C} + \overline{A}\,\overline{D} + B\,C\,D$$

$$F_{(A,B,C,D)}(POS) = (\overline{A} + \overline{C} + D)(A + B + \overline{C} + \overline{D})(A + \overline{B} + C + \overline{D})(\overline{A} + \overline{B} + D)$$

Part G $F_{(A,B,C,D)} = (\overline{A} + \overline{C} + \overline{D})$

Part H



prime implicant	essential?
$\overline{A}\,\overline{B}$	yes☒ no☐
$\overline{B}\,\overline{C}$	yes☐ no☒
$A\,\overline{C}$	yes☒ no☐

$$Out = \overline{A}\,\overline{B} + A\,\overline{C}$$