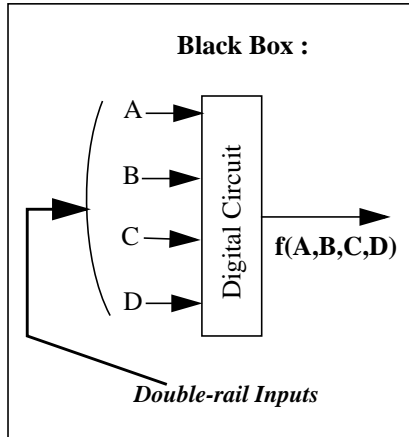
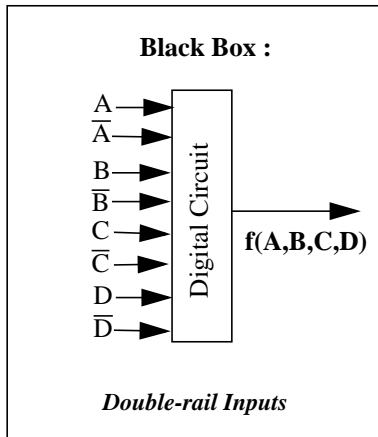


Function $f(A, B, C, D)$ in Different Representations



Truth Table :

A	B	C	D	f(A, B, C, D)
0	0	0	0	0
1	0	0	1	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	0
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

The minterm list :
 $f(A, B, C, D) = \sum m(1,3,5,7,9,13,15)$

The canonical SOP expression : A nonminimal SOP expression for function $f(A, B, C, D)$
 $f(A, B, C, D) = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}\bar{C}D + AB\bar{C}D + ABCD$

$f(A, B, C, D) = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}\bar{C}D + AB\bar{C}D + ABCD$
 $= \bar{A}D(\bar{B}\bar{C} + \bar{B}C + B\bar{C} + BC) + BD(\bar{A}C + A\bar{C} + A\bar{C} + AC) + \bar{C}D(\bar{A}\bar{B} + \bar{A}B + A\bar{B} + AB) \rightarrow k(m+p) = km+kp$
 $= \bar{A}D(\bar{B}(\bar{C} + C) + B(\bar{C} + C)) + BD(\bar{A}(C + \bar{C}) + A(\bar{C} + C)) + \bar{C}D(\bar{A}(\bar{B} + B) + A(\bar{B} + B)) \rightarrow k(m+p) = km+kp$
 $= \bar{A}D(\bar{B}(1) + B(1)) + BD(\bar{A}(1) + A(1)) + \bar{C}D(\bar{A}(1) + A(1)) \rightarrow k + \bar{k} = 1$
 $= \bar{A}D(\bar{B} + B) + BD(\bar{A} + A) + \bar{C}D(\bar{A} + A) \rightarrow k1 = k$
 $= \bar{A}D(1) + BD(1) + \bar{C}D(1) \rightarrow k + \bar{k} = 1$
 $= \bar{A}D + BD + \bar{C}D \rightarrow k1 = k \leftarrow \text{The minimal SOP expression}$

$f(A, B, C, D) = D(AB + \bar{C}) + \bar{A}BCD + \bar{A}\bar{B}D$ $= ABD + \bar{C}D + \bar{A}D(\bar{B} + BC)$ $= ABD + \bar{C}D + \bar{A}D(\bar{B} + C)$ $= ABD + \bar{C}D + \bar{A}\bar{B}D + \bar{A}CD$ $= ABD + \bar{A}\bar{B}D + D(\bar{C} + C\bar{A})$ $= ABD + \bar{A}\bar{B}D + \bar{C}D + \bar{A}D$ $= ABD + \bar{C}D + \bar{A}D(1 + \bar{B})$ $= ABD + \bar{C}D + \bar{A}D$ $= \bar{C}D + D(\bar{A} + AB)$ $= \bar{C}D + \bar{A}D + BD$	<p>Another nonminimal expression for function $f(A, B, C, D)$</p> $k(m + s) = km + ks$ $k + \bar{k}m = k + m$ $k(m + s) = km + ks$ $k(m + s) = km + ks$ $k + \bar{k}m = k + m$ & $k(m + s) = km + ks$ $k(m + s) = km + ks$ $k + 1 = 1$ & $k1 = k$ $k(m + s) = km + ks$ $k + \bar{k}m = k + m$ & $k(m + s) = km + ks$	<p>Additional non-minimal expressions for function $f(A, B, C, D)$</p> <p>Each expression represents function $f(A, B, C, D)$</p> <p>\leftarrow Minimal SOP expression</p>
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The maxterm list :
 $f(A, B, C, D) = \prod M(0,2,4,6,8,10,11,12,14)$

The canonical POS expression : A nonminimal POS expression for function f(A, B, C, D)
 $f(A, B, C, D) = (A+B+C+D)(A+B+\bar{C}+D)(A+\bar{B}+C+D)(A+\bar{B}+\bar{C}+D)(\bar{A}+B+C+D)(\bar{A}+B+\bar{C}+D)(\bar{A}+B+\bar{C}+\bar{D})(\bar{A}+\bar{B}+C+D)(\bar{A}+\bar{B}+\bar{C}+D)$

$f(A, B, C, D) = (A+B+C+D)(A+B+\bar{C}+D)(A+\bar{B}+C+D)(A+\bar{B}+\bar{C}+D)(\bar{A}+B+C+D)(\bar{A}+B+\bar{C}+D)(\bar{A}+B+\bar{C}+\bar{D})(\bar{A}+\bar{B}+C+D)(\bar{A}+\bar{B}+\bar{C}+D)$
 $f(A, B, C, D) = (D+(A+B+C)(A+B+\bar{C})(A+\bar{B}+C)(A+\bar{B}+\bar{C})(\bar{A}+B+C)(\bar{A}+B+\bar{C})(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C}))(\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k+mp = (k+m)(k+p)$
 $f(A, B, C, D) = (D+(A(B+C)(B+\bar{C})(\bar{B}+C)(\bar{B}+\bar{C}))(\bar{A}(B+C)(B+\bar{C})(\bar{B}+C)(\bar{B}+\bar{C}))) (\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k+mp = (k+m)(k+p)$
 $f(A, B, C, D) = (D+(A(B(C+\bar{C}))(\bar{B}(C+\bar{C})))(\bar{A}(B(C+\bar{C}))(\bar{B}(C+\bar{C})))) (\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k+mp = (k+m)(k+p)$
 $f(A, B, C, D) = (D+(A(B(1))(\bar{B}(1)))(\bar{A}(B(1))(\bar{B}(1)))) (\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k + \bar{k} = 1$
 $f(A, B, C, D) = (D+(A(B(\bar{B})))(\bar{A}(B(\bar{B})))) (\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k 1 = k$
 $f(A, B, C, D) = (D+(0)(0)) (\bar{A}+B+\bar{C}+\bar{D}) \rightarrow k \bar{k} = 0 \ \& \ k 0 = 0$
 $f(A, B, C, D) = (D)(\bar{A}+B+\bar{C}+\bar{D}) \rightarrow 0 0 = 0 \ \& \ k + 0 = k$
 $f(A, B, C, D) = D(\bar{A}+B+\bar{C}) \rightarrow k(\bar{k} + m) = km \leftarrow \text{The minimal POS expression}$

