3)

| AB \ CD | $\bar{C}\bar{D}$ | $\bar{C}D$ | $CD$ | $C\bar{D}$ |
|---|---|---|---|---|
| $\bar{A}\bar{B}$ | X | 0 | 0 | X |
| $\bar{A}B$ | 0 | 1 | 1 | 0 |
| $AB$ | 0 | 1 | 1 | X |
| $A\bar{B}$ | 1 | 0 | 0 | 1 |

$$G_1 = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D}$$

$$= \bar{A}\bar{B}\bar{D}\ (1)$$

$$= \bar{A}\bar{B}\bar{D}$$

$$G_2 = \bar{A}B\bar{C}D + AB\bar{C}D + \bar{A}BCD + ABC$$

$$= ABD(\bar{C}+C) + ABD(C+\bar{C})$$

$$= BD\ (\bar{A}+A)$$

$$= BD$$

$$G_3 = A\bar{B}\bar{C}D + A\bar{B}C\bar{D}$$

$$= A\bar{B}\bar{D}\ (\bar{C}+C)$$

$$= A\bar{B}D$$

$$X = \bar{A}\bar{B}\bar{D} + BD + \bar{A}\bar{B}\bar{D}$$

$$= \bar{B}\bar{D}\ (\bar{A}+A) + BD$$

$X = \bar{B} + D$ ~~.~~

$$X = \bar{B}\bar{D} + BD$$