



## Question 2

$$R1 = (C+D)$$

$$R2 = B^c$$

$$R3 = (C.D)$$

$$\begin{aligned} R4 &= (R1)^c \\ &= (C+D)^c \\ &= (C^c.D^c) \end{aligned} \quad \text{De Morgan's Law}$$

$$\begin{aligned} R5 &= (B.R4) \\ &= (B.(C+D)^c) \\ &= (B.(C^c.D^c)) \\ &= (B.C^c.D^c) \end{aligned} \quad \begin{array}{l} \text{De Morgan's Law} \\ \text{Associative Law} \end{array}$$

$$\begin{aligned} R6 &= (R1.R2) \\ &= ((C+D).(B^c)) \\ &= (B^c.C) + (B^c.D) \end{aligned} \quad \text{Distributive Law}$$

$$\begin{aligned} R7 &= (B.R1) \\ &= (B.(C+D)) \\ &= ((B.C) + (B.D)) \end{aligned}$$

$$\begin{aligned} W &= (A+R7) \\ &= (A+(B.(C+D))) \\ &= (A+(B.C) + (B.D)) \end{aligned} \quad \text{Distributive Law}$$

$$\begin{aligned} X &= (R5+R6) \\ &= (((C+D).(B^c)) + (B.(C+D)^c)) \\ &= (((C+D).(B^c)) + (B.(C^c.D^c))) \quad \text{De Morgan's Law} \\ &= (((C+D).(B^c)) + (B.C^c.D^c)) \\ &= (B^c.C) + (B^c.D) + (B.C^c.D^c) \quad \text{Distributive Law} \end{aligned}$$

$$\begin{aligned} Y &= (R3+R4) \\ &= ((C.D) + ((C+D)^c)) \\ &= ((C.D) + (C^c.D^c)) \quad \text{De Morgan's Law} \end{aligned}$$

$$Z = D^c$$

A	B	C	D	R1	R2	R3	R4	R5	R6	R7	W	X	Y	Z
0	0	0	0	0	1	0	1	0	0	0	0	0	1	1
0	0	0	1	1	1	0	0	0	1	0	0	1	0	0
0	0	1	0	1	1	0	0	0	1	0	0	1	0	1
0	0	1	1	1	1	1	0	0	1	0	0	1	1	0
0	1	0	0	0	0	0	1	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0	0	0	1	1	0	0	0
0	1	1	0	1	0	0	0	0	0	1	1	0	0	1
0	1	1	1	1	0	1	0	0	0	1	1	0	1	0
1	0	0	0	0	1	0	1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0	0	1	0	1	1	0	0
1	0	1	0	1	1	0	0	0	1	0	1	1	0	1
1	0	1	1	1	1	1	0	0	1	0	1	1	1	0
1	1	0	0	0	0	0	1	1	0	0	1	1	1	1
1	1	0	1	1	0	0	0	0	0	1	1	0	0	0
1	1	1	0	1	0	0	0	0	0	1	1	0	0	1
1	1	1	1	1	0	1	0	0	0	1	1	0	1	0

[illegible]

**Question 3**

$$R1 = A^c$$

$$R2 = C^c$$

$$R3 = D^c$$

$$R4 = E^c$$

$$R5 = F^c$$

$$\begin{aligned} R6 &= (A.R2.E) \\ &= (A.C^c.E) \end{aligned}$$

$$\begin{aligned} R7 &= (A.R2.F) \\ &= (A.C^c.F) \end{aligned}$$

$$\begin{aligned} R8 &= (A.R3.E) \\ &= (A.D^c.E) \end{aligned}$$

$$\begin{aligned} R9 &= (A.R3.F) \\ &= (A.D^c.F) \end{aligned}$$

$$\begin{aligned} R10 &= (B.C.D.R4.R5) \\ &= (B.C.D.E^c.F^c) \end{aligned}$$

$$\begin{aligned} R11 &= (R1.B.C.D) \\ &= (A^c.B.C.D) \end{aligned}$$

$$R12 = (A.B.E)$$

$$R13 = (A.B.F)$$

$$R14 = (B.C.E)$$

$$R15 = (B.C.F)$$

$$\begin{aligned} G &= (R6 + R7 + R8 + R9 + R10) \\ &= ((A.C^c.E) + (A.C^c.F) + (A.D^c.E) + (A.D^c.F) + (B.C.D.E^c.F^c)) \end{aligned}$$

$$\begin{aligned} H &= (R11+R12+R13+R14+R15) \\ &= ((A^c.B.C.D) + (A.B.E) + (A.B.F) + (B.C.E) + (B.C.F)) \end{aligned}$$