

Part 1

1.

3 Input AND Gate

A	B	C	OUTPUT
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

AND & OR Gate

A	B	C	AND (A ∧ B)	OR (AND ∨ C)
0	0	0	0	0
0	0	1	0	1
0	1	0	0	0
0	1	1	0	1
1	0	0	0	0
1	0	1	0	1
1	1	0	1	1
1	1	1	1	1

2.

Answer is 1, because $A \wedge B \wedge C \wedge D = 1 \wedge 0 \wedge 1 \wedge 1 = \text{not } 0 = 1$

Part 2

1.

Absorption law, $= A$

$$A * B + A * C + B * C$$

2. \longrightarrow

Simplified

A*B	A*C	B*C	Out
0	0	0	0
0	0	0	0
0	0	0	0
0	0	1	1
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	1

Original

A	B	C	B+C	A*(B+C)	B*C	out
0	0	0	0	0	0	0
0	0	1	1	0	0	0
0	1	0	1	0	0	0
0	1	1	1	0	1	1
1	0	0	0	0	0	0
1	0	1	1	1	0	1
1	1	0	1	1	0	1
1	1	1	1	1	1	1

Part 3

1. \overline{D}

\overline{D}	00	01	11	10
00	0	1	x	1
01	x	0	x	x
11	x	x	1	x
10	x	x	x	x

$$1: D \cdot \overline{A} \cdot \overline{B}$$

$$2: \overline{A} \cdot \overline{B} \cdot C$$

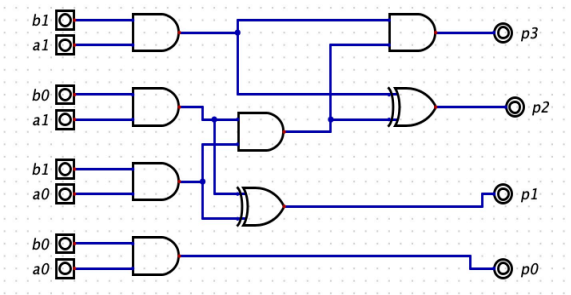
$$3: B \cdot C \cdot D$$

$$(D\overline{A}) + (\overline{A}\overline{B}C) + (B \cdot C \cdot D)$$

2. $(D \cdot \overline{A} \cdot \overline{B}) + (\overline{A} \cdot \overline{B} \cdot C) + (B \cdot C \cdot D)$

Part 4

1.



k-maps

A1A0\B1B0 P0 Boolean Expression $B0 \times A0$

	00	01	11	10
00	0	0	0	0
01	0	1	1	0
11	0	1	1	0
10	0	0	0	0

A1A0\B1B0 P1 $A1 \times \neg B1 \times B0$
 $B1 \times \neg B0 \times A0$ $\neg A1 \times A0 \times B1$

Boolean Expression: $(A1 \times \neg B1 \times B0) + (\neg A1 \times A0 \times B1) + (B1 \times \neg B0 \times A0)$

	00	01	11	10
00	0	0	0	0
01	0	0	0	1
11	0	1	0	1
10	0	1	0	0

A1A0\B1B0 P2 $A1 \times \neg A0 \times B1$ $A1 \times B1 \times \neg B0$

Boolean Expression: $(A1 \times \neg A0 \times B1) + (A1 \times B1 \times \neg B0)$

	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	1
10	0	0	1	1

A1A0\B1B0 P3 $A1 \times A0 \times B1 \times B0$

Boolean Expression: $(A1 \times A0 \times B1 \times B0)$

	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	1	0
10	0	0	0	0

2.

AB/C X

Boolean Expression: $(B \times C) + (A \times B)$

	B x C	A x B
0 0	0	0
0 1	0	1
1 1	1	1
1 0	0	0

AB/C Y

Boolean Expression: $(A \times C) + (A \times \neg B) + (\neg B \times C) + (\neg C \times \neg A \times B)$

	A x C	A x ~B	~B x C	~C x ~A x B
0 0	0	0	0	0
0 1	0	1	0	0
1 1	0	0	0	0
1 0	1	0	0	0

