

Q1 Truth Table 1

a	b	c	ab	ac	ab+ac
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	0	1
1	1	1	1	1	1

Truth Table 2

a	b	c	b+c	a(b+c)
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	1	0
1	0	0	0	0
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

Such that $ab+ac$ is equivalent to $a(b+c)$

Q2 The expression $ab+bc$ requires ⁶ transistors (two AND gates and one OR gate)

The expression $a(b+c)$ requires 4 transistors (one OR gate and one AND gate)

Such that ~~6N - 2N = 4N~~ fewer transistors will be used.
 $6N - 4N = 2N$

Q3 The expression $a + bc$ is equivalent to the expression $(a+b)(a+c)$

Truth Table 1.

a	b	c	a+b	a+c	(a+b)(a+c)
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	0	0
0	1	1	1	1	1
1	0	0	1	1	1
1	0	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1

Truth Table 2

a	b	c	bc	a+bc
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	1	1
1	0	0	0	1
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Q4 The expression $(a+b)(a+c)$ requires 6 transistors. (two OR gate and one AND gate)

The expression $a + (b+c)$ requires 4 transistors. (one AND gate and one OR gate)

Such that $6N - 4N = 2N$ fewer transistors will be used.

Q5

