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## CMPE 240 2018 Experiment 2 Preliminary Work

### Truth Tables

#	i2	i1	i0	b
0	0	0	0	1
1	0	0	1	0
2	0	1	0	1
3	0	1	1	0
4	1	0	0	1
5	1	0	1	1
6	1	1	0	1
7	1	1	1	0

### Sum of Products (SOP)

$$\begin{aligned}
 b &= (i2' i1' i0') + (i2' i1 i0') + (i2 i1' i0') + (i2 i1' i0) \\
 &\quad + (i2 i1 i0')
 \end{aligned}$$

### Minimized SOP

$$b = (i2' i0') (i1' + i1) + (i2 i1' i0') + (i2 i1' i0) + (i2 i1 i0')$$

from distributive Law

$$= (i2' i0') 1 + (i2 i1' i0') + (i2 i1' i0) + (i2 i1 i0')$$

from complement Law

$$= (i2' i0') + (i2 i1' i0') + (i2 i1' i0) + (i2 i1 i0')$$

from identity Law

$$= (i2' i0') + (i2 i1' i0') + (i2 i1 i0') + (i2 i1' i0)$$

from commutative Law

$$= (i2' i0') + (i2 i0') (i1 + i1') + (i2 i1' i0)$$

from distributive Law

$$=(i_2' i_0') + (i_2 i_0')1 + (i_2 i_1' i_0)$$

**from complement law**

$$=(i_2' i_0') + (i_2 i_0') + (i_2 i_1' i_0)$$

**from identity law**

$$= (i_2 i_0') + (i_2 i_1' i_0)$$

**from idempotency law**

$$= (i_2) (i_0' + i_1' i_0)$$

**from distributive law**

$$= (i_2) (i_0' + i_1' i_0)$$

**from distributive law**

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### **Product of Sums (POS)**

$$b = (i_2 + i_1 + i_0') (i_2 + i_1' + i_0') (i_2' + i_1' + i_0')$$

### **Minimized POS**

$$b = (i_2 + i_1 + i_0') (i_1' + i_0') + (i_2' i_2)$$

**from distributive Law**

$$= (i_2 + i_1 + i_0') (i_1' + i_0') + 0$$

**from complement Law**

$$= (i_2 + i_1 + i_0') (i_1' + i_0')$$

**from identity Law**

$$= (i_0') + (i_2 + i_1)(i_1')$$

**from distributive Law**

$$= (i_0') + (i_2 i_1' + i_1 i_1')$$

**from distributive Law**

$$= (i_0') + (i_2 i_1' + 0)$$

**from complement Law**

$$= (i_0') + (i_2 i_1')$$

**from identity Law**

Circuit

