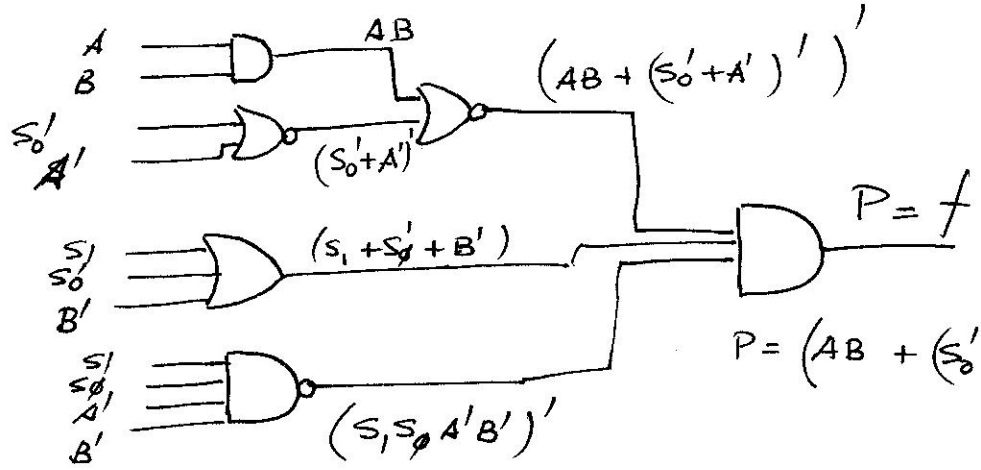
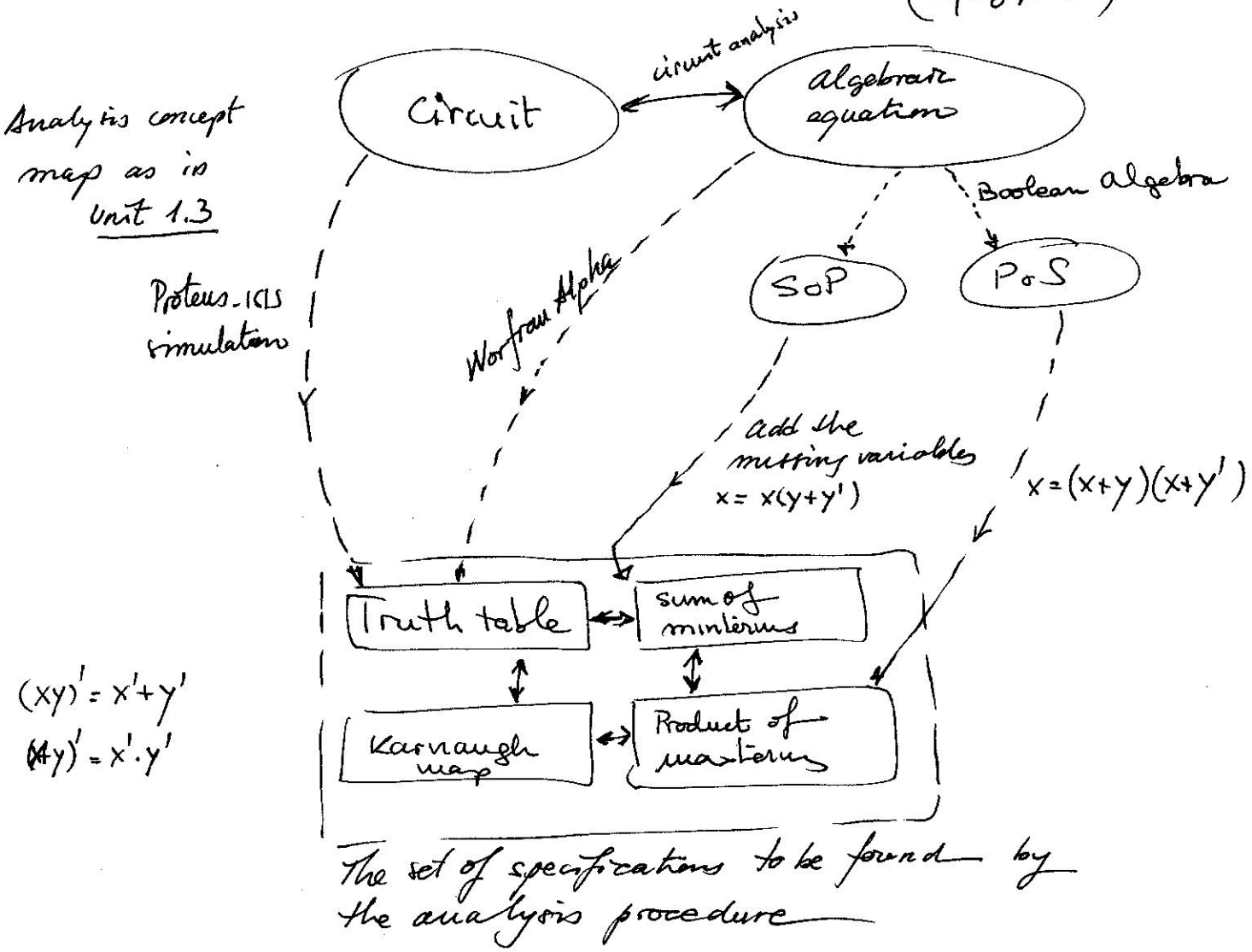
* Circuit 1A to be analyzed



The algebraic equation carries the same information as the circuit

$$P = \left(AB + (S_0' + A')'\right)' \cdot (S_1 + S_0' + B') \cdot (S_1 S_0' A' B')'$$

Analysis concept map as in Unit 1.3



So, let's solve it analytically. Let's see how to find a SoP or a PoS. Term by term simplification:

$$\left(AB + (S_0' + A')'\right)' = (AB)' \cdot (S_0' + A')'' = (A' + B')(S_0' + A')$$

So, it becomes a product of sums:

$$(S_1 S_0' A' B')' = (S_1' + S_0 + A + B)$$

PoS →

$$P = (A'+B')\cdot(S_0'+A')\cdot(S_1+S_0'+B')\cdot(S_1'+S_0+A+B)$$

Let's add the missing variables now, in order to obtain the product of maxterms

$$(A'+B') = (S_0+A'+B')(S_0'+A'+B')$$

$$(S_1+S_0+A'+B')(S_1'+S_0+A'+B') \qquad (S_1+S_0'+A'+B')\cdot(S_1'+S_0'+A'+B')$$

$$M_{0011}\cdot M_{1011}\cdot M_{0111}\cdot M_{1111}$$
$$3 \qquad 11 \qquad 7 \qquad 15$$

$$(S_0'+A') = (S_1+S_0'+A')\cdot(S_1'+S_0'+A')$$

$$(S_1+S_0'+A'+B)\cdot(S_1+S_0'+A'+B') \qquad (S_1'+S_0'+A'+B)(S_1'+S_0'+A'+B')$$

$$M_{0110}\cdot M_{0111}\cdot M_{1110}\cdot M_{1111}$$
$$6 \qquad 7 \qquad 14 \qquad 15$$

$$(S_1+S_0'+B') = (S_1+S_0'+A+B')\cdot(S_1+S_0'+A'+B')$$

$$M_{0101}\cdot M_{0111}$$
$$5 \qquad 7$$

So, finally $P = f(S_1,S_0,A,B) = M_3\cdot M_5\cdot M_6\cdot M_7\cdot M_{11}\cdot M_{14}\cdot M_{15}\cdot M_8$

$$P = \prod_4 M(3,5,6,7,8,11,14,15)$$

And: $\Rightarrow P = \sum_4 m(0,1,2,4,9,10,12,13)$

$m_1 = m_{0001} = S_1'\cdot S_0'\cdot A'\cdot B$ ← Be aware!

$m_9 = m_{1001} = S_1\cdot S_0'\cdot A'\cdot B$