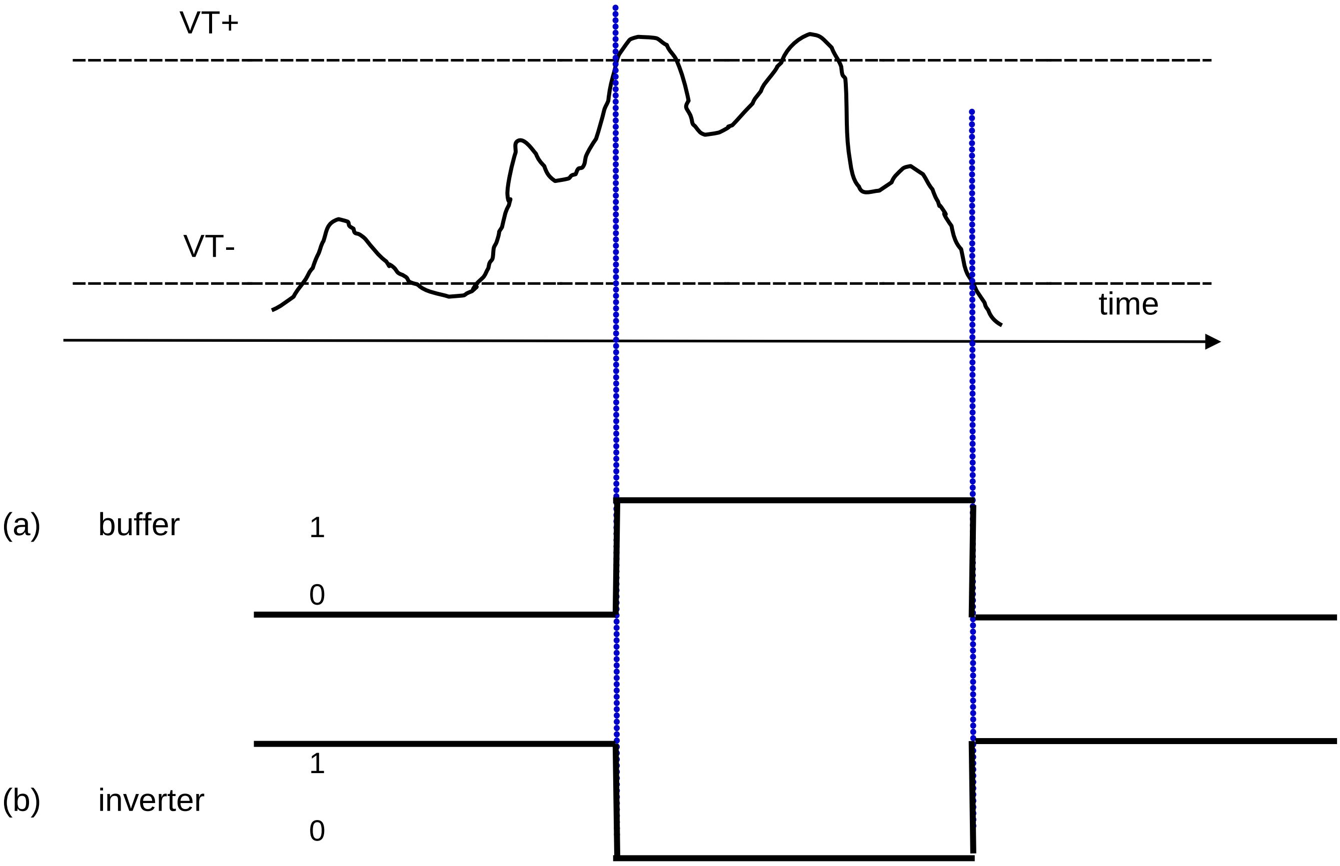
Answers

1



2. Convert the truth table into K-maps. Output x needs 3 products, output y needs 3 products. They share 1 common product (red loop).

x

ab \ cd	00	01	11	10
00	**1**	**1**	**0**	**1**
01	**1**	**1**	**0**	**0**
11	**0**	**0**	**1**	**1**
10	**1**	**0**	**1**	**1**

$x = a'c' + ac + b'd'$

P1 = a'c'

P2 = ac

y

ab \ cd	00	01	11	10
00	**1**	**0**	**1**	**1**
01	**0**	**0**	**1**	**1**
11	**1**	**1**	**0**	**0**
10	**1**	**1**	**0**	**1**

$y = ac' + a'c + b'd'$

P3 = b'd'

P4 = ac'

P5 = a'c

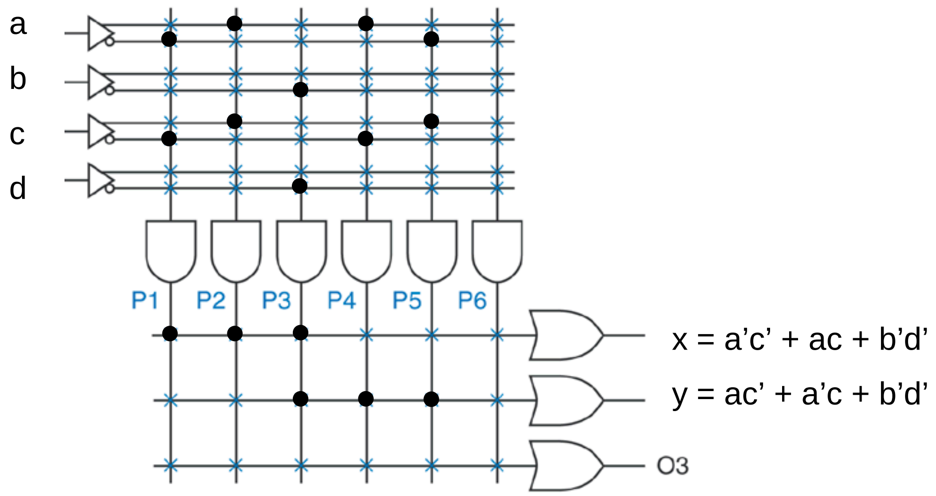


Figure 6-22
Compact representation of a 4 × 3 PLA with six product terms.

<u>Optional (for students who like to go beyond the course requirement)</u>

3. (a) The smallest non-zero <u>positive</u> value in the specified 8-bit floating-point is 0 100 0000

Thus exponent = -4 (in decimal) [assume no bias*]

Significand = 1.0000 (in binary)

Thus binary value is +1.0000 x 2(-4) = 0.0001

Decimal equivalent is +2^(-4) = +0.0625

(b) The largest <u>positive</u> value in the specified 8-bit floating-point is

0 011 1111

Thus exponent = +3 (in decimal) [assume no bias*]

Significand = +1.1111 (in binary)

Thus binary value is +1.1111 x 2^(+3) = 1111.1

Decimal equivalent is +2^3 + 2^2 + 2^1 + 2^0 + 2^(-1) = 15.5

(c) s = 1 means the significand is negative

Exponent = 111 which is -1 in decimal [assume no bias*]

Significand = 1.1001 in binary

Thus the value in binary is -1.1001 x 2(-1) = -0.11001

The decimal value is – [2^(-1) + 2^(-2) + 2^(-5)] = - 0.78125

*In a typical floating-point system the exponent is likely to be added with a bias (e.g. +100) such that the range of exponent [100,011] ([-4,+3] in decimal) is shifted to [000, 111] instead (i.e. 000 represents -4, 111 represents +3). This makes it easier to compare the exponents of two different values.