Solution to HW3

(1) Note that

$$f = x_2(x_1 x_4 + x_3 \bar{x}_4) + \bar{x}_2(\bar{x}_1 \bar{x}_3)$$

$$= x_2 \cdot g + \bar{x}_2 \cdot h$$

where $g = x_1 x_4 + x_3 \bar{x}_4$

and $h = \bar{x}_1 \bar{x}_3$

} both can be implemented using 3 input LUTs.

(2) $$F = AB\bar{C} + \bar{A}C\bar{D} + ABD + \bar{B}C\bar{D}$$

$$= AB(\bar{C} + D) + (\bar{A} + \bar{B})C\bar{D}$$

$$= AB \oplus C\bar{D}$$

$F_1 = AB$

$F_2 = C\bar{D}$

$F = F_1 \oplus F_2$

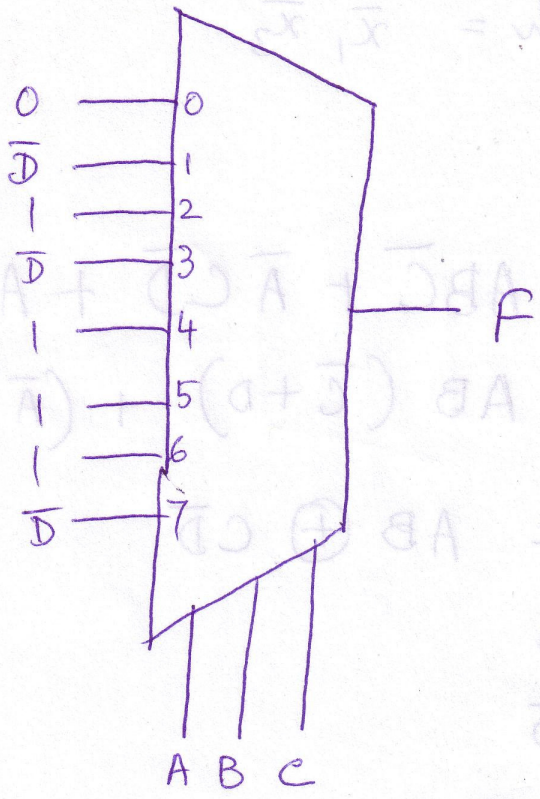
(3) Hard Macro —

specifies how logic elements are physically interconnected and placed

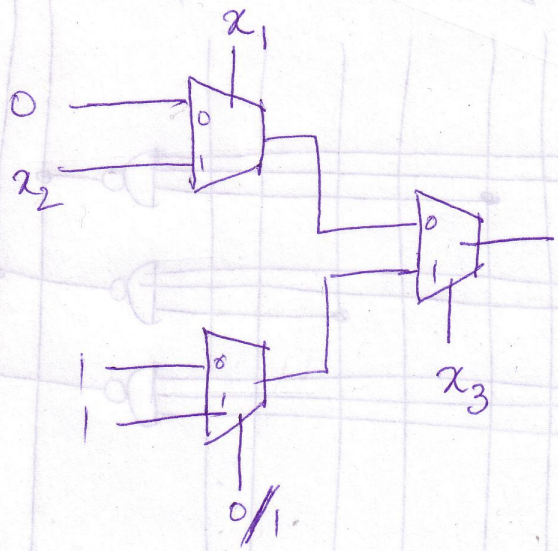
Soft Macro —

only logical interconnection specified

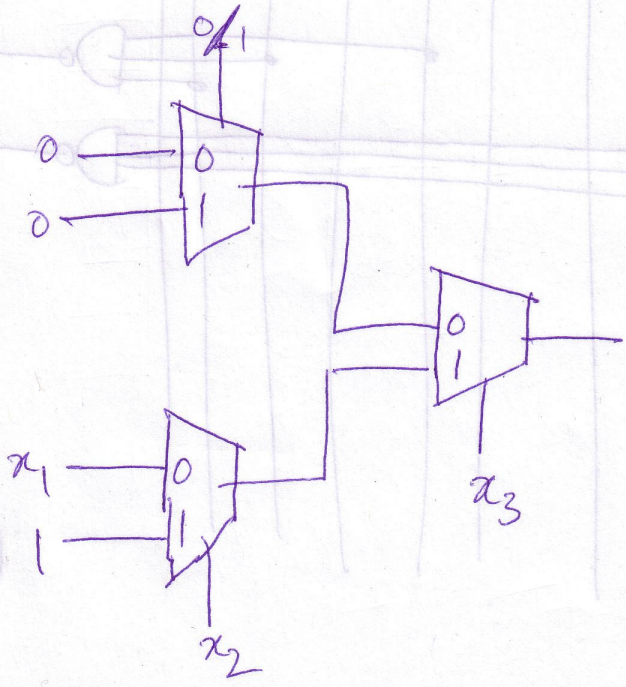
(4)



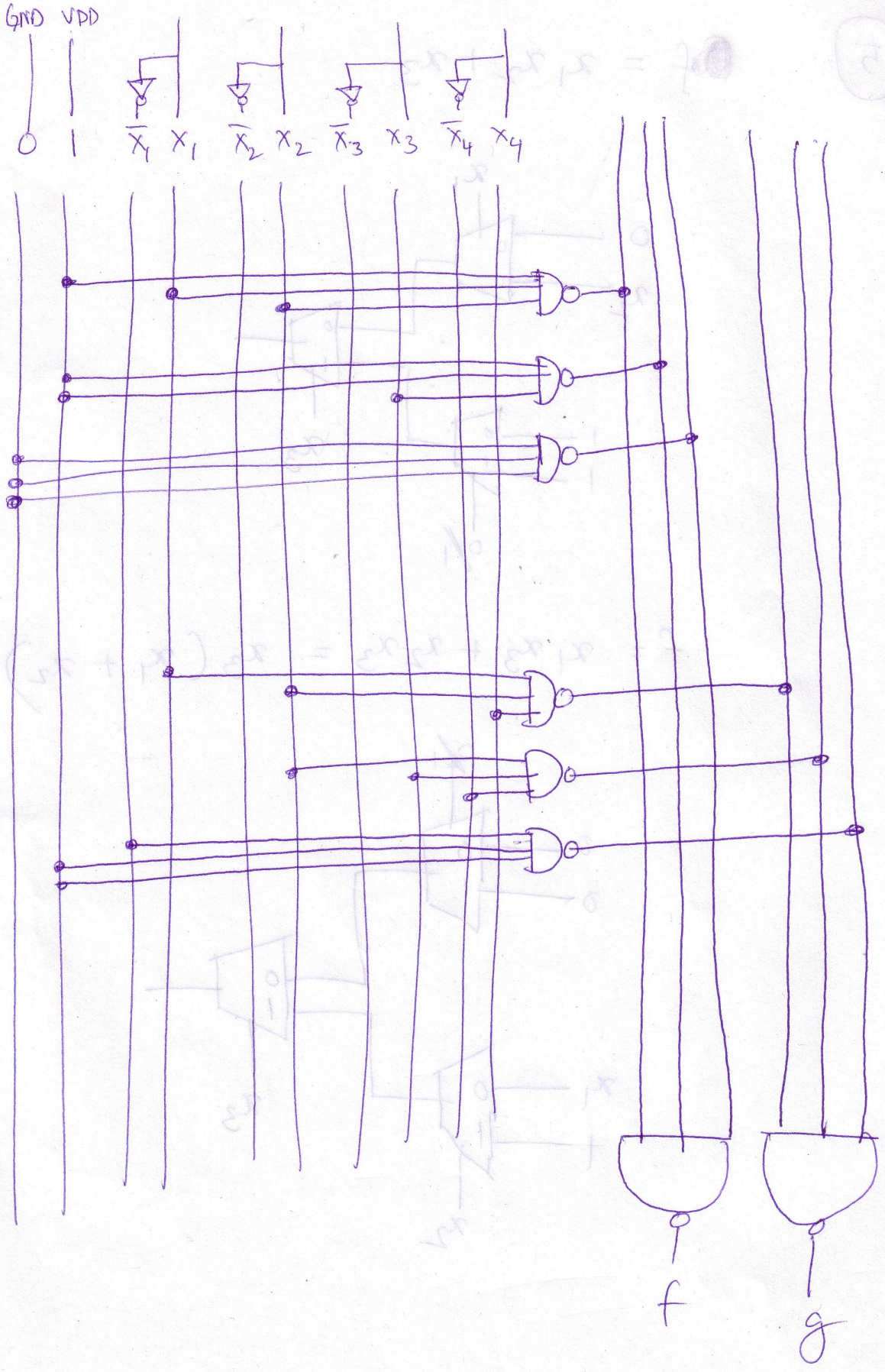
(5) $f = x_1 x_2 + x_3$



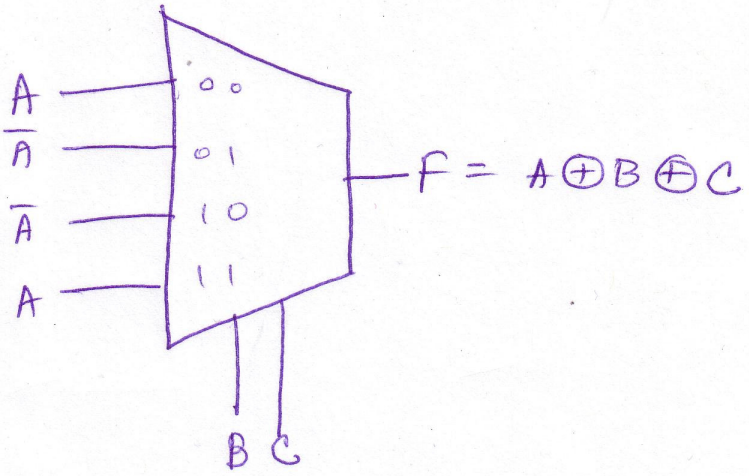
$f = x_1 x_3 + x_2 x_3 = x_3 (x_1 + x_2)$

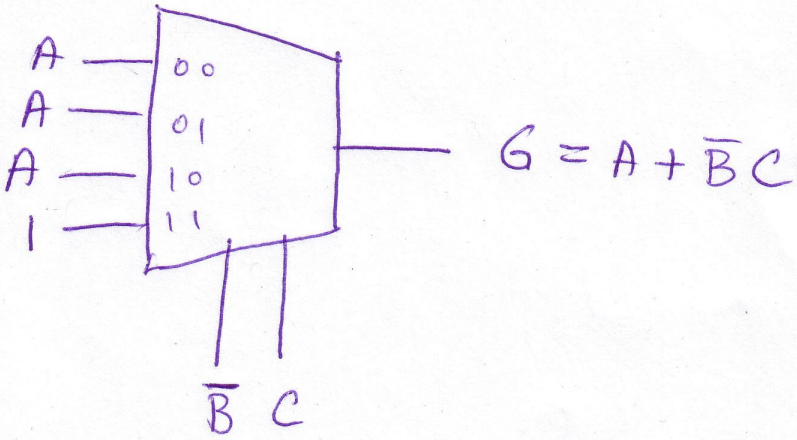


(6)



(7)


A
$\overline{A}$
$\overline{A}$
A
00
01
10
11
B C
$F = A \oplus B \oplus C$


A
A
A
1
00
01
10
11
$\overline{B}$ C
$G = A + \overline{B}C$