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CSC 137 HW 2

1.6 What is the biggest FP decimal number that can be represented in 16 bit Format using 1 bit sign, 4 bit biased exponent & 11 bit Fraction, where bias offset = 7

0 1111 11111111111

Sign bit — biased exponent — Fraction

Sign bit = positive

biased exponent = 1111 = 15 (8 4 2 1)

bias = 7

exponent = 15 − 7 = 8

exponent = 8 move 8 places to the right

11111111.111 convert to decimal

11111111.111 Used online converter

(255.875)

1.8 What real number does FP number with sign = 0, bias exponent = 1, and fraction = 0 represent, bias = 7

0 0001 .000 0000 0000

Signbit — biased exponent — Fraction

Sign bit = 0

exponent = 1 − 7 = −6 $1.000\ 000\ 000\ 00 \times 10^{-6}$ Negative exponent move left

.000001

.000001 Now convert from binary to decimal

$2^{-1}\,2^{-2}\,2^{-3}\,2^{-4}\,2^{-5}\,2^{-6} = 0.015625$

2.4 Proof Demorgans Theroem $\overline{x+y} = \bar{x}\bar{y}$ by crecting truth tables for $f = \overline{x+y}$ & $g = \bar{x}\bar{y}$

$\overline{X+Y}$ Table

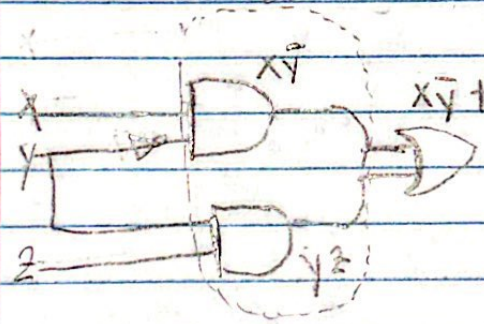
X	Y	OR	NOT
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

$\overline{XY}$ Table

X	Y	$\bar{X}$	$\bar{Y}$	$\overline{XY}$
0	0	1	1	1
0	1	1	0	0
1	0	0	1	0
1	1	0	0	0

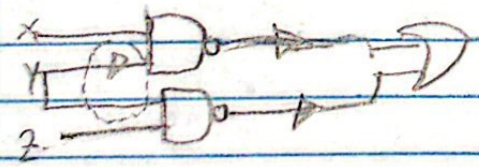
The Truth Tables are exactly the same therefore $\overline{x+y} = \overline{gy}$

2.5 Draw the circuit schematic For $f = x\bar{y} + yz$ & convert to NAND Gates.

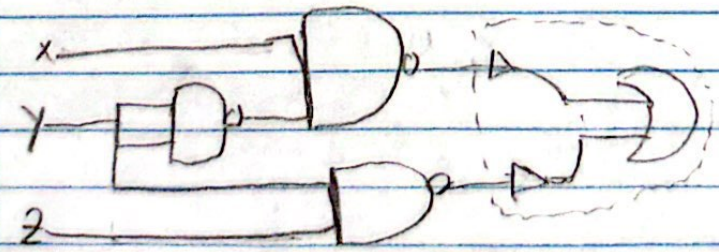


$x\bar{y} + yz$

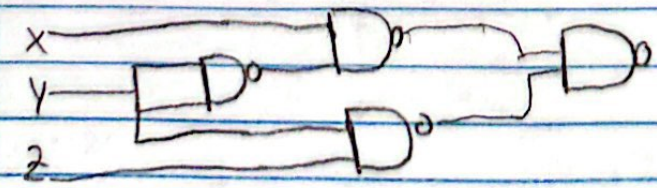
Convert to Nand gates by adding a Not in the front



Convert y Not gate to Nand gate



Convert inverted or gate to Nand gate



$f = x\bar{y} + yz$