

Homework #2

- 1.6) What is the biggest positive FP number (in decimal) that can be represented in 16-bit format using 1-bit sign, 4-bit biased exponent, and 11-bit fraction, where bias offset is 7?

0 1110 1111 1111 111

$$\text{Unbiased exponent} = 14 - 7 = 7$$

$$1.11111111111 \times 2^7$$

11111111.1111

$$1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 = 255$$

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = 0.9375$$



255.9375

- 1.8) Do the following assuming 16-bit FP numbers with 4-bit bias exponent, bias offset = 7, and 11-bit fraction:

(a): What real number does an FP number with sign = 0, bias exponent = 1 and fraction = 0 represent? (Answer in 4 decimal places)

0 0001 0000 0000 000
+ 1 0

$$\text{Unbiased exponent} = 1 - 7 = -6$$

$$1.00000000000 \times 2^{-6}$$

0.000001

$$\frac{0}{2} + \frac{0}{4} + \frac{0}{8} + \frac{0}{16} + \frac{0}{32} + \frac{1}{64} = \boxed{0.0156}$$

- 2.4) Prove Demorgan's Theorem $\overline{x+y} = \bar{x} \cdot \bar{y}$ by creating truth tables for $f = \overline{x+y}$ and $g = \bar{x} \cdot \bar{y}$. Are the two truth tables identical?

$$\overline{x+y}$$



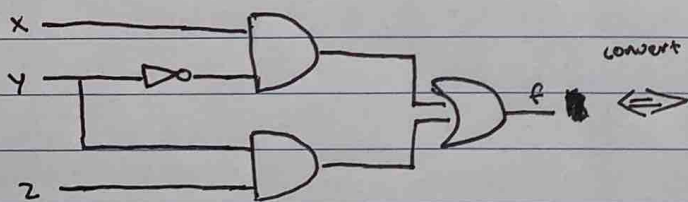
$$\bar{x} \cdot \bar{y}$$

INPUTS		Output	
x	y	$x+y$	$\overline{x+y}$
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

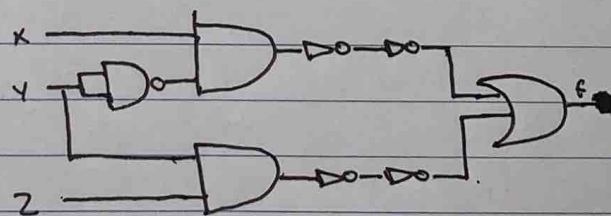
INPUTS		OUTPUT	
x	y	\bar{x}	\bar{y}
0	0	1	1
0	1	1	0
1	0	0	1
1	1	0	0

After creating truth tables for both $\overline{x+y}$ and $\bar{x} \cdot \bar{y}$ we were given the same truth tables.

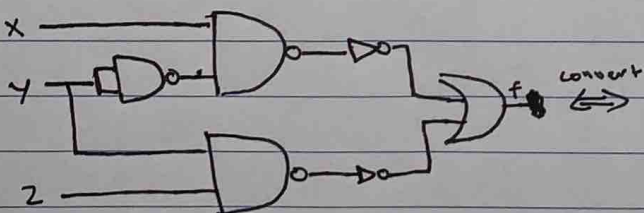
- 2.5) Draw the circuit schematic for $f = x\bar{y} + yz$ and then convert the schematic to NAND gates using the steps illustrated in the textbook.



convert



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