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CSC 137

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

Unbiased exponent = 14 - 7 = 7

$1.1111\,1111\,111 \times 2^{7}$

11111111.1111

1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 = 255 $\Leftrightarrow$ **255.9375**

1/2 + 1/4 + 1/8 + 1/16 = 0.9375

(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

Unbiased exponent = 1 - 7 = -6

$1.00000000000 \times 2^{-6}$

0.000001

0/2 + 0/4 + 0/8 + 0/16 + 0/32 + 1/64 = **0.0156**

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

$$\overline{x+y} \iff \overline{x} \cdot \overline{y}$$

	INPUTS		Output
	x y	x+y	$\overline{x+y}$
r_0	0 0	0	1
r_1	0 1	1	0
r_2	1 0	1	0
r_3	1 1	1	0

	INPUTS				OUTPUT
	x	y	$\overline{x}$	$\overline{y}$	$\overline{x} \cdot \overline{y}$
r_0	0	0	1	1	1
r_1	0	1	1	0	0
r_2	1	0	0	1	0
r_3	1	1	0	0	0

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

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