HW #2

CSc 137, Harvey

Total (16 pts)

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? **(4 pts)**

→ 0111 0111 1111 1111

$= \underbrace{0}_{+pos} \; \underbrace{1110}_{exp} \; \underbrace{1111\ 1111\ 111}_{mantissa}$

step 2 : exp bit = 14 - offset

= 14 - 7

= 7

step3 : mantissa → 1.11111111111×2^7

step 4:

= 11111111.1111

$= 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 + 2^{-1} + 2^{-2} + 2^{-3}$

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

= 255.875

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

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

exponent = biased_exponent - bias

biased_exponent = exponent + bias

2) exponent = 1 - 7

= -6

4) fraction = 0

5) combine

1.0×2^{-6}

$= (0.000001)_2$

$= 2^{-6}$

= 0.015625

= 0.0156

2.4 Proof Demorgan's Theorem $\overline{x+y} = \bar{x}\,\bar{y}$ by creating truth tables for $f = \overline{x+y}$ and $g = \bar{x}\,\bar{y}$. Are the two truth tables identical? **(4 pts)**

x	y	$\bar{x}$	$\bar{y}$	$x+y$	$\overline{x+y}$	$\bar{x}\,\bar{y}$
0	0	1	1	0	1	1
1	0	0	1	1	0	0
0	1	1	0	1	0	0
1	1	0	0	1	0	0

f g

2.5 **(4 pts)** 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.