ECEN 651 HW5 Zhenlei Song

1\. (a) 10.0 = 1010.00

$= 1.010 \times 2^3$

~~sig~~ single

sign = 0 expon = 3 mant = 1.010

127 + 3 = 130 = 1000 0010

0, 10000010, 010 0000 0000 0000 00000000

(b) 10.5 = 1010.101

$= 1.010101 \times 2^3$

sign = 0 expon = 3 mant = 1.010101

127 + 3 = 130 = 1000 0010

0, 1000 0010, 0101010 00 0 00000 00000000

(c) 0.1 = 0.00011 = $1.10011\,0011\cdots \times 2^{-4}$

~~sing~~ sign = 0 expon = −4 mant = 1.10011 0011⋯

127 − 4 = 123 = 01111011

0, 0111 1011, 10011 0011 0011 0011 0011 00

double (a) 1023 + 3 = 1026 = 100 0000 0010

~~0~~ 10.0 = 0, 100 0000 0010, 010 ⋯ 0

(b) 1023 + 3 = 1026 = 100 0000 0010

10.5 = 0, 100 0000 0010, 010101 0000 ⋯ 0

(c) ~~0.5~~ 1023 − 4 = 1019 = ~~201~~ 011 1111 1011, 10011 0011 0011 ⋯ 001

2. $S_1 = 1.0100$ $e_1 = 0$

$S_2 = 0.1001$ $e_2 = 0$

signs are different

replase S_2 as $S_2 = 1.0111$

$S = S_1 + S_2$

$= (1)\,0.1011$

$\because$ signs are different, ignore carry out

$\therefore$ shift left till normallized

$S = 1.011$ $e = -1$

result is 1.011×2^{-1}

3. a. suppose A is positive B is negative

$A+B = a-b$

(1) compl(b)

(2) a + compl(b) = S

if S has a carry out, S is positive

S has the same sign as A

$S = a-b = A+B$

otherwise S has the same sign as B

$S = -(b-a) = A+B$

b. in part a. we show that A and B have different signs, floating point addition can be performed within 1 adder.

for A and B have the same sign.

r and s bits can be obtained before addition.

(1) If a roundup is indicated,

$S = a+b+1$

(2) If no roundup indicated

$S = a+b$

thus floating addition can be performed in one adder