Computer Organization
Reference Solution
HW3

3.9 $-105 - 42 = -128\ (-147)$

3.10 $-105 + 42 = -63$

3.11 $151 + 214 = 255\ (365)$

3.22

$0\times0C000000 = 0000\ 1100\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000$

$= 0\ 0001\ 1000\ 0000\ 0000\ 0000\ 0000\ 0000\ 000$

sign is positive

$exp = 0\times18 = 24 - 127 = -103$

there is a hidden 1

mantissa = 0

answer $= 1.0 \times 2^{-103}$

3.23 $63.25 \times 10^0 = 111111.01 \times 2^0$

normalize, move binary point 5 to the left

1.1111101×2^5

sign = positive, exp = 127+5=132

Final bit pattern: 0 1000 0100 1111 1010 0000 0000 0000 000

= 0100 0010 0111 1101 0000 0000 0000 0000 = 0x427D0000

3.27 $-1.5625 \times 10^{-1} = -.15625 \times 10^0$

$= -.00101 \times 2^0$

move the binary point 3 to the right, $= -1.01 \times 2^{-3}$

exponent = −3 = −3+15 = 12, fraction = −.0100000000

answer: 1011000100000000

3.32 $(3.984375 \times 10^{-1} + 3.4375 \times 10^{-1}) + 1.771 \times 10^{3})$

$3.984375 \times 10^{-1} = 1.1001100000 \times 2^{-2}$

$3.4375 \times 10^{-1} = 1.0110000000 \times 2^{-2}$

$1.771 \times 10^{3} = 1771 = 1.1011101011 \times 2^{10}$

shift binary point of smaller left 12 so exponents match

```
(A)          1.1001100000
(B)        + 1.0110000000
           -------------
           10.1111100000 Normalize,
(A+B)       1.0111110000 × 2^-1
(C)        +1.1011101011
(A+B)        .0000000000 10 111110000 Guard = 1,
                         Round = 0, Sticky = 1
          ---------------
(A+B)+C  +1.1011101011 10 1 Round up
```

$(A+B)+C = 1.1011101100 \times 2^{10} = 0110101011101100 = 1772$