Floating Point Exercise 1:

1) 175.5 → Single precision Exponential bias = 7+127=134

175 = 1010 1111 > 10101111.1 = 1.01011111 × 2^7

0.5 × 2 = 1.0 >

Single Precision format: 0 | 1000 0110 | 0101111 | 10000...

Hex equivalent: 43 2F 80

2) 0.09375 → Single precision

Exponential bias = -4+127=123

000011 ⟶ 0.0001 = 1.1 × 2^{-4}

0.09375 × 2 = 0.1875

0.1875 × 2 = 0.375

0.375 × 2 = 0.75

0.75 × 2 = 1.5

0.5 × 2 = 1.0

Single Precision Format: 0 | 011 1101 | 1000 0000 | 0000 0...

Hex equivalent: 3DC0 00

3) -0.0078125 → Double precision

0.0078125 × 2 = 0.015625 0.0000001 = 1.0 × 2^{-7} Exponential bias = -7+1023 = 1016

0.015625 × 2 = 0.03125

0.03125 × 2 = 0.0625 Double Precision Format: 1 | 011 1111 1000 | 0000...

0.0625 × 2 = 0.125

0.125 × 2 = 0.25 Hex Representation: BF 80 00

0.25 × 2 = 0.5

0.5 × 2 = 1.0

4) -11.75 → Double precision

Exponential Bias = 3 + 1023 = 1026

-11 = 1011.11 → 1.01111×2^3

0.75 x 2 = (1).5

0.5 x 2 = (1).0

Double Precision Format: 1100|0000|0010|0111|1000|0000...

Hex Representation: C02780

5) 3160.0 → Double extended precision

3160 = 1100.0101.1000.0000

= 1100.0101.1000 = $1.1000101100000 \times 2^{11}$

Exponential Bias = 11 + 16383 = 16394

Double Extended Precision: 0100|0000|1010|1000|1011|0000...

Hex Representation: 40 A8 B0 / 40 0A C5 80 (as per the listing file)

6) -1.25 → Double extended precision

Exponential Bias = 0 + 16383 = 16383

1 = 0001.01 → 1.01×2^0

0.25 x 2 = 0.5

0.5 x 2 = 1.0

Double Precision Format: 1011|1111|1111|0100|0000...

Hex Representation: BF F4 00