ACTIVITY 16

1. Convert (unsigned) 101.011_2 to decimal.

2. a. Convert 11.1875 to binary.

   b. Convert 8.375 to binary.

3. Which of the following have a finite binary representation?

   $^1/_3$ $^1/_8$ $^1/_{12}$ $^1/_{16}$ $^1/_{20}$ $3^7/_8$ 6.3   7.25

4. Suppose AL contains 00101011b and is a Q4.3 representation of a fixed-point value.

   a. What is the underlying integer?

   b. What is the fixed-point value it represents, in *binary*? in *decimal*?

5. a. What is the range of values that can be represented by n-bit signed integers?

    b. How many total bits are in a $Qm.f$ representation?

    c. What is the scale factor for $Qm.f$ fixed point numbers?

    d. Use the above facts to derive the range of $Qm.f$ fixed-point integers.

6. How would you convert a Q4.3 fixed-point value to a Q5.2 representation?

7.

$$\begin{array}{llll} 000001.01_2 & 1^1/_4 & 00000101_2 & 5 \\ +\,000000.01_2 & +\ ^1/_4 & +\,00000001_2 & +\,1 \\ \hline \end{array}$$

8.

$$\begin{array}{lll} 000001.00_2 & 00000100_2 & 1 \\ \times\,000001.00_2 & \times\,00000100_2 & \times\,1 \\ \hline \end{array}$$

9. In decimal, $3.5 \times 0.5 = 1.75$. Suppose 0111 and 0001 are 4-bit underlying integers representing Q2.1 fixed-point values (11.1_2 and 0.1_2). Show how the multiplication algorithm given will multiply these values and round to the nearest $^1/_2$.

8. In decimal, $3 \div 4.5 \cong 0.6667$. Suppose 00110 and 01001 are 5-bit underlying integers representing Q3.1 fixed-point values (11.0_2 and 100.1_2). Show how the division algorithm given will divide these values and round to the nearest $^1/_2$.