CS 429 Homework 2

Name: ___________________________ Section #: _______________________

Instructions: Work these problems on your own paper, and then write your answers on this page. As usual, you may collaborate with your classmates and ask for assistance from the TA. But don’t copy anyone else’s answer. Each problem is worth the same number of points (more or less). We’ll be setting things up to turn in on Canvas.

1. Convert between binary and decimal representations:
   (a) 11.475 to binary
   (b) Binary 110000011001111 to hexadecimal
   (c) Binary 101.1111 to decimal

2. Show the result of rounding to the nearest 1/8 according to the round-to-even rule:
   (a) 11.0001
   (b) 11.0010

3. We have a 9bit FP representation based on the IEEE 754 standard: 1 for the sign, 4 for the exponent and 4 for the fraction. You may need to round. You should show your work for partial credit.
   (a) Represent 0.125 (1/8) in this system.
   (b) Represent 5.25 in this system.
   (c) Obtain the product of the two numbers from (a) and (b) above:
      • Add the two exponents using exponent encoding:
      • Multiply the two significands including rounding:
      • Give the result in 9-bit binary format.
   (d) Obtain the sum:
      • Normalize so both have same exponent:
      • Now show the sum, which may require normalizing exp or rounding.

4. Extra Credit: Prove by induction that sign extension preserves the value.