

**Please show all work on this sheet.** Please fold this sheet the long way and write **your name** and **Homework 3** (or **HW 3**) on the outside.

Consider the following 9-bit floating point representation based on the IEEE floating point format:

- There is a sign bit in the most significant bit.
- The next 4 bits are the biased exponent. The exponent bias is  $2^{4-1} - 1 = 7$ .
- The rightmost 4 bits are the fraction.
- The representation encodes numbers of the form:  $V = (-1)^s \times M \times 2^E$ , where  $M$  is the significand and  $E$  is the unbiased exponent.

The rules are like those in the IEEE standard (normalized, denormalized, representation of 0, infinity, and NAN). fill in the table below. Here are the instructions for each field:

- **Binary:** The 9-bit binary representation.
- **M:** The value of the significand. This should be a number of the form  $x$  or  $\frac{x}{y}$ , where  $x$  is an integer, and  $y$  is an integral power of 2. Examples include 0,  $\frac{19}{4}$ ,  $\frac{31}{2^{23}}$ .
- **E:** The integer value of the unbiased exponent.
- **Value:** The value of the number as a decimal number or rational fraction (quotient of integers).

Note: You need not fill in a box marked with "—". Any empty box requires an answer.

Description	Binary	$M$	$E$	Value
—	1 0111 1111			
Normalized negative closest to zero				
—				44.25