

# CMPUT 229 - Quiz #4 — Winter 2014

Name: \_\_\_\_\_

The following is a format for the binary representation of a floating-point number:

10	9	5	4	0
S	<i>exponent</i>	<i>fraction</i>		

The exponent is expressed using a bias of 15. Given the binary representation above, the decimal value of the number represented can be computed by the following expression:

$$N = \begin{cases} 0.0 & \text{if } exponent = 0 \text{ and } fraction = 0 \\ (-1)^S \times 0.fraction \times 2^{-15} & \text{if } exponent = 0 \text{ and } fraction \neq 0 \\ (-1)^S \times 1.fraction \times 2^{-15} & \text{if } 0 < exponent < 31 \\ (-1)^S \times \infty & \text{if } exponent = 31 \text{ and } fraction = 0 \\ NaN & \text{if } exponent = 31 \text{ and } fraction \neq 0 \end{cases}$$

## Question 1 (3 points):

Let  $X = 40_{10}$ . Give the normalized binary representation for  $X$  and the bit pattern representation of  $X$  in this notation.

## Question 2 (3 points):

Let  $Y = 4.25_{10}$ . Give the normalized binary representation for  $Y$  and the bit pattern representation of  $Y$  in this notation.

**Question 3 (4 points):** If this machine has an adder with a round bit, a guard bit and a sticky bit, what is the value of  $X + Y$  computed by this machine? Give both the normalized binary notation and the decimal value.