Name: Id#

COE 301/ICS 233, Term 171

Computer Architecture & Assembly Language

Quiz# 4 Solution

Date: Thursday, Nov. 16, 2017

## **Q1.** What is the decimal value of the following single-precision floating-point number?

## **1100 0010 1110 1101 1000 0000 0000 0000**. (2 Points)

= - (1.1101101100000000...0)2 \* 2(133-127)

= - (1.1101101100000000...0)2 \* 26

= - (1110110.1100000000...0)2 = - 118.75

# Show the single-precision floating-point binary representation for: **120.125**.

## (2 Points)

120.125=(1111000.001)2 = (1.111000001)2 \* 26

Exp. = 6 +127=133

Single precision binary representation:

## **0100 0010 1111 0000 0100 0000 0000 0000**

# Perform the following floating-point operation rounding the result to the **nearest even**. Perform the operation using **guard**, **round** and **sticky** bits.

## (6 Points)

**1.000 1000 0000 0000 0000 0000 000 x 28**

## **-** **1.000 0000 0000 0000 0000 0100 000 x 24**

**1.000 1000 0000 0000 0000 0000 000 x 28**

**-** **1.000 0000 0000 0000 0000 0100 000 x 24**

**= 1.000 1000 0000 0000 0000 0000 000 x 28**

**- 0.000 1000 0000 0000 0000 0000 010 x 28 (align)**

**= 01.000 1000 0000 0000 0000 0000 000 x 28**

**+ 11.111 0111 1111 1111 1111 1111 110 x 28 (2's complement)**

## **=** **00.111 1111 1111 1111 1111 1111 110 x 28**

## **=** **+0.111 1111 1111 1111 1111 1111 110 x 28**

## **=** **+1.111 1111 1111 1111 1111 1111 100 x 27 (normalize)**

## Next, we round to the nearest even by adding 1 and the result becomes:

## **=** **+10.000 0000 0000 0000 0000 0000 x 27 (round)**

Next, we renormalize the result and the result becomes:

## **=** **+1.000 0000 0000 0000 0000 0000 x 28 (renormalize)**