CS230 Winter 2018 – Assignment 2
Due Date: Friday, June 8, 2018, 11:30 p.m.
Weight: 5% of the course grade

1. [1 mark] Consider the following sequence of bits:

000000001111110

What is the UTF-16 interpretation? Provide the hexcodes and descriptions of the actual character represented.

2. [6 marks] Floating-Point (Use IEEE single-precision 32-bit floating point representation)
   a) Convert the decimal number -97.25 to its raw floating-point binary representation (Raw implies that the final answers should consist only of 0s and 1s and no signs or points). Show all steps. [3.5 marks]

   b) Add the following two floating point binary numbers using floating point binary addition and give the answer in the normalized binary floating point representation (1.xxxxx... * 2y). Also, convert this answer to its decimal value. Show all steps. [2.5 marks]

   \[
   11000010010110010000000000000000 + 01000100000101100010000000000000
   \]

3. [4 marks] MIPS
   a) Convert the C code below into exactly 3 MIPS instructions. Assume the base address of Z is stored in $17, the base address of K is stored in $18. Use $8 as the only temporary register. (No other temporary registers are allowed) [2 marks]

   \[
   Z[7] = -7 + K[0];
   \]

   For question 3(b),
   
   - Your programs must compile with the given MIPS assembler `binasm` in the student.cs environment. No partial marks if the program does not execute correctly.
   - Your solution should include comments at the beginning that include your name, your Quest ID, a brief description of the program, and a list of the registers with a brief description of how they are being used.
   - Remember when you are checking your results that the values that appear in the registers are all hexadecimal numbers.

   b) Write a MIPS program to calculate the result of the following expression and place the result in register $7. You can use any registers between $8-$15 as temporary registers. [2 marks]

   \[
   (30987-20790)^2
   \]