Com S 321 Homework 7 Due: Tuesday, Oct. 17, 2017 before midnight

1. Convert each of the following into a 32-bit two's complement binary number:

(a) 512_{ten}
(b) $-1{,}023_{ten}$
(c) $-4{,}000{,}000_{ten}$

2. Write the decimal number represented by each of the following two's complement binary numbers:

(a) $(1111\ 1111\ 1111\ 1111\ 1111\ 1110\ 0000\ 1100)_{two}$
(b) $(1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111)_{two}$
(c) $(0111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111)_{two}$

3.

(a) For the hexadecimal number 0x 7FFF FFFA, what binary number does it represent?

(b) Write the hexadecimal number represented by the following binary number:

$(1100\ 1010\ 1111\ 1110\ 1111\ 1010\ 1100\ 1110)_{two}$

4. Two friends, Harry and David, are arguing. Harry says, "All integers greater than zero and exactly divisible by six have exactly two 1s in their binary representation." David disagrees. He says, "No, but all such numbers have an even number of 1s in their binary representation." Do you agree with Harry or with David, or with neither? Justify your answer with a proof or counterexamples.

5. Bits in the memory of a computer have no inherent meaning. They mean something only under an interpretation.

Given the bit pattern:

1000 1111 1110 1111 1100 0000 0000 0000

what does it represent under each of the following interpretations:

(a) a two's complement integer?
(b) an unsigned integer?
(c) a MIPS instruction?