

Homework 1

Due: Beginning of class Thursday, January 31st

Turnin: Four solutions: **1 iv, 1 v, 5, and 9**. To receive credit for your solutions, you must show your work where applicable. Solutions to the remaining problems are attached.

1. — Assume that 16-bit, two's complement, binary numbers are being used in this problem. Some binary arithmetic and conversions. For each of the pairs of numbers below, compute:

- a.) hexadecimal (base 16) equivalents for both a and b, assume unsigned numbers
- b.) octal (base 8) equivalents for both a and b, assume unsigned numbers
- c.) decimal (base 10) equivalents for both a and b, assume signed numbers
- d.) $a + b$ and indicate if overflow occurs, assume signed numbers
- e.) $a - b$ by negating b and adding, indicate if overflow occurs, assume signed numbers

i.) **a = 0100 0111 0101 1000**

b = 1000 0000 1100 0110

ii.) **a = 0001 0000 0011 1000**

b = 0111 0010 0100 1011

iii.) **a = 0000 0000 0110 1100**

b = 0000 0001 1010 1001

iv.) **turnin this one (15 points, 3 points each part)**

a = 1011 0001 1111 0101

b = 1001 0111 1101 0011

v.) **turnin this one (15 points, 3 points each part)**

a = 0110 1011 1001 1000

b = 0100 1101 0010 1111

2. — **problem 3.30, page 232 [15] <§§3.2, 3.6>** Given the bit pattern (not the same as the textbook's bit pattern):

1000 1111 1110 1111 1100 0000 0000 0000

what does it represent, assuming that it is

- a.) a two's complement integer?
- b.) an unsigned integer?
- c.) a single precision floating-point number?

3. — This exercise is similar to the previous one, but this time, use the bit pattern:

0000 0000 0000 0000 0000 0000 0000 0000

4. — This exercise is similar to the previous one, but this time, use the bit pattern:

0011 1100 0011 0000 0000 0000 0000 0000

5. turnin this one (15 points, 5 points each part) — This exercise is similar to the previous one, but this time, use the bit pattern:

0011 1110 0111 0100 0000 0000 0000 0000

6. — **problem 3.37, page 232 [5] <§3.6>** Show the IEEE754 binary representation for the floating-point number 10_{ten} in single and double precision.

7. — This exercise is similar to the previous one, but this time use 10.5_{ten} .

8. — This exercise is similar to the previous two, but this time use -42.3125_{ten} .

9. turnin this one (10 points, 5 points each part)— This exercise is similar to the previous 3, but this time use $43,650.0078125_{\text{ten}}$.