

CPS-104 Homework 1

Written assignment. **Due September 7**, (in class, stapled!) [total 100 points]

Please monitor the newsgroup `duke.cs.cps104` for corrections, updates, and questions answered.

- 1 [6 pts] Convert 512_{10} into 32-bit two's complement binary number.
- 2 [6 pts] Convert -1023_{10} into 32-bit two's complement binary number.
- 3 [8 pts] What decimal number does this two's complement binary number represent:
1111 1111 1111 1111 1111 1110 0001 1100
- 4 [8 pts] What decimal number does this two's complement binary number represent:
1111 1111 1111 1111 1111 1111 1111 1111
- 5 [6 pts] What binary number does this hexadecimal number represent:
0x7ffffeca ?
- 6 [6 pts] What hexadecimal number does this binary number represent:
1100 1010 1111 1110 1011 1010 1100 1110
- 7 [6 pts] Consider the hex string **0x414C5659**. Convert the string to a 32-bit binary number.
- 8 [6 pts] What string of ASCII characters would the above string represent?
- 9 [6 pts] Is the floating-point number represented by the above binary string greater than, or less than, 1? Give the values of the exponent and the mantissa in hex.
- 10 [10 pts] Show the binary representation for the floating point number 10.125_{10} .
- 11 [10 pts] Show the binary representation for the floating point number 0.7_{10} .
- 12 [10 pts] Consider the 32-bit sequence:
1100 0000 1010 0000 0000 0000 0000 0000
What is the value of the above sequence, when interpreted as a floating-point number?
- 13 [6 pts] Interpret the above sequence as an unsigned integer, and divide it by 2. (Give the answer in binary)
- 14 [6 pts] The following are two 12-bit two's complement numbers:
A = 0xFDA, B = 0x137.
Convert to binary and compute **A+B** and **A-B** in 12-bit two's complement. Give the answers in hexadecimal.