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| **CS 224, Sp2015**  **Homework #1**  **Introduction**  **S01: Data Types** | Name | | Section | Score  / 48 |
| Questions: | | Answers: | | |
| 1. (3 points) Name three characteristics of algorithms. Briefly explain each of these characteristics. | |  | | |
| 2. (3 points) Why is an ISA considered an abstraction level? | |  | | |
| 3. (3 points) What are the decimal values of the following 8-bit unsigned binary integers?   1. 01001010 2. 11111100 3. 10000011 | |  | | |
| 4. (3 points) What are the decimal values of the following 16-bit 2's complement binary integers?   1. 0010111101100101 2. 1101111111101000 3. 1000000000000001 | |  | | |
| 5. (3 points) What are the decimal values of the following 12-bit 1's complement binary integers?   1. 100011000111 2. 011111111111 3. 100000000000 | |  | | |
| 6. (3 points) Convert the following decimal values to 16-bit 2's complement binary numbers.   1. -19 2. 256 3. -555 | |  | | |
| 7. (6 points) Convert the following Q8.8 fixed point numbers (16-bit, 2’s complement) to decimal values.   1. 0001001000110100 2. 1111111111111111 3. 0000111101000000 | | *a.**b.**c.* | | |
| 8. (6 points) Convert the following 32-bit IEEE 754 floating point numbers to decimal values.   1. 0x3F800000 2. 0xC0300000 3. 0x42800000 | | *a.**b.**c.* | | |
| 9. (3 points) Write the following 16-bit binary numbers in hexadecimal notation.   1. 1100110101101001 2. 1111111011101101 3. 1101111010101111 | | *a.*  b.  c. | | |
| 10. (3 points) How many bits are required to represent the following decimal numbers as 2’s complement binary numbers?   1. -64 2. 31 3. 128 | | *a.* *b.* *c.* | | |
| 11. (12 points) Fill in the results of the following operations:  |  |  |  | | --- | --- | --- | | Sign-magnitude | 1’s Complement | 2’s Complement | | 00100110 | 00100110 | 00100110 | | + 10001101 | + 10001101 | + 10001101 | | a. | b. | c. | | + 11111101 | + 11111101 | + 11111101 | | d. | e. | f. | | + 00101101 | + 00101101 | + 00101101 | | g. | h. | i. | | + 10111101 | + 10111101 | + 10111101 | | j. | k. | l. | | | | | |