CS 429 Homework 1

Name: __________________________ Section #: _____________________

Instructions: The proctors will be circulating more information on the file format they require.

1. Perform the following number conversions:
   (a) 0xABC0F1 to binary
   (b) Binary 110000011001111 to hexadecimal
   (c) Binary 11000011001111 to octal (base 8)

2. Convert between decimal and hexadecimal:
   (a) 147 to hexadecimal
   (b) 0xAE to decimal

3. Solve directly in hexadecimal: 0xB75D + 0x8AF

4. Perform the following operations on x = 0xA5 and y = 0x2C (answer in hex):
   (a) x & y
   (b) x && y
   (c) "x & !(y | (x ^ y))"

5. Perform the following shift operations on the byte x = 0xB9 (answer in hex):
   (a) x << 3
   (b) x >> 1, logical
   (c) x >> 3, arithmetic
6. Write out and sum the non-zero powers of two for the two functions shown. Express output in decimal:

(a) \(B_{2U5}(0x2E)\)

(b) \(B_{2T5}(0x2E)\)

7. Apply the function \(T_{2U5}\) to the two following decimal values. Express the answer as a decimal number.

(a) -7

(b) 12

8. Assuming an 8-bit machine that uses 2’s complement arithmetic, apply the appropriate casting and express the result as a relational value (true or false):

(a) \(-127 == 127U\)

(b) \(-127-1U == 127\)

(c) \(-1U < 128U\)

(d) \(255U == -128\)

9. Express \(x*K\) using on only the specified number of operations:

(a) \(K = 7\), using 1 shift and 1 Add/Sub

(b) \(K = -13\), using the fewest possible shifts and Add/Subs

10. Write C expressions that evaluate to 1 when the following conditions are true and to 0 when they are false. Assume \(x\) is of type int.

(a) Any bit of \(x\) equals 1.

(b) Any bit of \(x\) equals 0.

(c) Any bit in the least significant byte of \(x\) equals 1.