HW6

1. Find the 1's complement and 2's complement of the following binary numbers: 10100111, 10101011, 01110011, 11100101, and 01010101.

2. Performed the addition. The numbers are 2's complement numbers. (a) 0101 + 1110, (b) 0111110 + 1101011. Indicate whether overflow occurs.

3. Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend. (a) 0101 – 0110, (b) 10110 – 1100, (c) 1011110 – 1111110, (d) 101010 – 101.

4. Repeat Problem 3, assuming the numbers are 2's complement signed numbers. Perform the subtraction and indicate whether overflow occurs.

5. Repeat Problem 3, assuming the numbers are signed-magnitude signed numbers. Perform the subtraction and indicate whether overflow occurs.

6. Perform the arithmetic operations (+27) – (50) and (-42) – (30) in binary using signed 2's complement representation for negative numbers.

7. Design a 4-bit absolute value calculator, $Z=|z|$.

8. Design a 4-bit x 4-bit multiplier using four-bit adders (Ripple-Carry adders) and other logic gates.

9. Design a multiplier that multiplies two 3-bit 2's complement signed numbers.

10. Use Verilog to design the circuit in problem 7.