*Always show all work for full credit.*

1. Determine the largest & smallest 12-bit number as:

a. Sign/magnitude

b. Unsigned

c. Two’s complement

2. Fill in the missing values in the following table:

|  |  |  |
| --- | --- | --- |
| **Binary** | **Decimal** | **Hex** |
|  | 38 |  |
|  | 268 |  |
|  |  | AE |
|  |  | 32 |

3. Convert the following numbers to 8-bit two’s complement:

a. 57

b. -42

4. Convert the following 8-bit two’s complement numbers to decimal:

a. 1001 1101

b. 0110 1110

5. Perform the following additions and subtractions of two’s complement numbers:

a. 1011 0011 b. 0101 0111 c. 0011 0111

**+** 0111 0110 **+** 0111 0011 **-** 0101 1000

6. Exercise 1.73 from the text: “A majority gate produces a TRUE output if and only if more than

half of its inputs are TRUE. Complete a truth table for the three-input majority

gate shown in Figure 1.42.”



Figure 1.42

7. Convert the following 8-bit two’s complement numbers to 16-bit two’s complement numbers.

a. 1001 1101

b. 0110 1110

8. Without using a calculator, estimate the number of bits required to represent for the following numbers:

a. 1,500

b. 30,000,000

c. How would your answer change if you had to also represent the negative of that number?