*Always show all work for full credit.*

1. Determine the largest (closest to $+\infty )$ & smallest (closest to $-\infty $) values (in decimal) that can be represented with 9-bit number for each representation:

a. Sign/magnitude

Largest:

Smallest:

b. Unsigned

Largest:

Smallest:

c. Two’s complement

Largest:

Smallest:

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

|  |  |  |
| --- | --- | --- |
| **Binary** | **Decimal** | **Hex** |
|  | 42 |  |
|  | 312 |  |
|  |  | EE |
|  |  | 80 |

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

a. 59

b. -47

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

a. 0011 0101

b. 1110 1010

5. Perform the following additions of two’s complement numbers (show work):

a. 1001 0111 b. 0010 0101 c. 0111 1111

 **+** 0011 0010 **+** 0100 0011 **+** 0000 0001

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 with the same value.

a. 0010 1101

b. 1110 1001