Name: Id#

COE 202, Term 131

Digital Logic Design

Quiz# 5

Date: Thursday, Nov. 28

# 

**Q1**. Fill in all blank cells in the two tables below. All binary representations use 7 bits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Binary | Equivalent decimal value with the binary interpreted as: | | | |
| Unsigned number | Signed-magnitude number | Signed-1’s complement number | Signed-2’s complement number |
| 1011010 |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Decimal | Binary representation in: | | |
| Signed-magnitude notation | Signed-1’s complement notation | Signed-2’s complement notation |
| - 59 |  |  |  |

b. Using 2’s-complement signed arithmetic in **5 bits**, perform the following operations in binary. Show all your work. Verify that you get the expected decimal results.

**Check for overflow and mark clearly any occurrences of it.**

|  |  |
| --- | --- |
| (i)  11010  + 11001 | (ii)  00101  - 10100 |
| (iii)  (+5)  + (-9) | (iv)  (-6)  - (+8) |

c. When doing signed 2’s complement arithmetic in **6 bit**s, the *smallest* binary number **that will cause overflow** when *subtracted* from (101000)2 is \_\_\_\_\_\_\_\_\_\_\_.

**Q2**.

1. You are given **one 3-to-8 decoder**, **one NOR** gate and **one OR** gate to implement the two functions given below.

**F1 (A,B,C) = Π M (0, 1, 4, 5, 6)**

**F2 (A,B,C) = ∑ m (0, 4, 6) + ∑d( 1, 3)**

Draw the circuit and properly label all input and output lines.

1. Given the truth table below for a function with four inputs (A, B, C and D) and one output F, implement F using a 4-to-1 MUX (with 2 select lines) and additional logic. Show how you obtained your solution, and properly label all input and output lines. Apply A and B to the select inputs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **F** |
| **0** | **0** | **0** | **0** | **0** |
| **0** | **0** | **0** | **1** | **1** |
| **0** | **0** | **1** | **0** | **0** |
| **0** | **0** | **1** | **1** | **1** |
| **0** | **1** | **0** | **0** | **1** |
| **0** | **1** | **0** | **1** | **1** |
| **0** | **1** | **1** | **0** | **1** |
| **0** | **1** | **1** | **1** | **1** |
| **1** | **0** | **0** | **0** | **1** |
| **1** | **0** | **0** | **1** | **1** |
| **1** | **0** | **1** | **0** | **0** |
| **1** | **0** | **1** | **1** | **0** |
| **1** | **1** | **0** | **0** | **0** |
| **1** | **1** | **0** | **1** | **0** |
| **1** | **1** | **1** | **0** | **0** |
| **1** | **1** | **1** | **1** | **0** |