ECE 274A Fall 2018

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**LAB Session (Circle one): Fri 2-4.50 pm**

1. **(5 pts)** Design a circuit that outputs F = 1 when an **absolute value (abs)** of its 8-bit input A (A is an 8-bit signed number using 2’s complement format) is less than 30 or greater 85. In other words, if abs(A) < 30 OR abs(A) > 85, F = 1, else F = 0

|  |  |  |
| --- | --- | --- |
| For example, if | A = -100, | abs(-100) = 100 =>then F= 1 |
|  | A = -35, | abs(-35) = 35 => then F = 0 |
|  | A = 54, | abs(54) = 54 => then F = 0 |
|  | A = 99, | abs(99) = 99 => then F = 1 |

Your circuit must be designed such that it works for any given value of 8-bit signed number A.

*Assume that you have the following datapath components available* ***(unsigned only)***:

8-bit unsigned magnitude comparator(s), 8-bit full adder, muxes (size of your choice) and the n- bit input AND, OR, NOT gates (here “n” is your choice).

Cleary label your components, indicate the input values when necessary, properly connect all components and show bit-width on each wire (if more than 1 bit).

1. **(5 pts)** Design a **2-bit ALU** using 2-bit adder and muxes for the following operation table:

|  |  |  |
| --- | --- | --- |
| **s1** | **s0** | **ALU operation** |
| 0 | 0 | A << 1 filled with 0 (shift A to the left by 1 bit, using 0 to fill the empty position) |
| 0 | 1 | NOT B |
| 1 | 0 | A + B |
| 1 | 1 | A - B |