Review Problem 6

- Register X0 has the address of a 3 integer array. Set X15 to 1 if the array is sorted (smallest to largest), 0 otherwise.

```
LDUR x1, [x0, #0]   // x1 = array[0]
LDUR x2, [x0, #8]   // x2 = array[8]
LDUR x3, [x0, #16]  // x3 = array[16]
ADD x15, x31, x31   // set to 0 initially
CMP x1, x2          // is x1 < x2?
B.GT UNSORTED
CMP x2, x3          // is x2 < x3?
B.GT UNSORTED
ADDI x15, x31, #1   // set to 1 - sorted

UNSORTED:
```
ALU: Arithmetic Logic Unit

Computes arithmetic & logic functions based on controls
Add, subtract
XOR, AND, NAND, OR, NOR

... > overflow,

Overflow, Negative, Zero

Controls Select Function

R

64

B

64

A
ALU Output Bus

4:1 Mux

00

01

10

11

A'

B'

Add, Subtract, AND, OR

Bit Slice ALU Design

h?
Bit Slice ALU Design (cont.)
Optional shift by two: \( A \gg \text{b}^1 \)

Optional shift by one: \( A \gg \text{b}^0 \)

Support shift operations: \( A \gg 001101 \)

Shifter