

Question 1: Address Calculation I have a 10-element integer array whose base address is 20. What is the address of element 9?

Question 2: Size of Memory Address If the size of our memory is 4 GB, how many bits do we need to address our memory? (1GB = 2^{30} bytes)

Question 3: RISC-V: What Do We Remember? Consider the following instructions:

```
addi t0, t0, 1
add  t1, t0, a0
sub  a0, t1, t0
```

3.1. For each instruction, identify which register(s) are **read** and which register is **written**.

Instruction	Registers Read	Register Written
addi t0, t0, 1		
add t1, t0, a0		
sub a0, t1, t0		

3.2. Which instruction uses a value that is **not stored in a register**? What is that value?

3.3. What do you notice about the position of the destination register in each instruction?

Question 4: Assembly Tracing Suppose register `t0` initially contains:

`t0 = 0b00000000_00000000_00000000_00000101`

The processor executes:

`addi t0, t0, -2`

4.1. What signed decimal value is initially stored in `t0`?

4.2. What signed decimal value should be stored in `t0` after the instruction executes?

4.3. Write the new 32-bit value of `t0` in binary.