1.In MIPS , what’s the difference among “ j ” , ” jr ” , “ jal “ ? What’s their instruction format?

Ans:

j (jump) : jump directly to a given label without any condition.

jal (jump and link) : store the following address of instruction in $ra and jump to anywhere in memory (target address)

jr (jump register) : jump to the address in register which is usually $ra (return address register)

instruction format :

j label / jal label / jr $register

2. Calculate the immediate field and show the machine code for the branch not equal (bne) instruction in the following program.

0x40 loop: add $t1, $a0, $s0

0x44 lb $t1, 0($t1)

0x48 add $t2, $a1, $s0

0x4C sb $t1, 0($t2)

0x50 addi $s0, $s0, 1

0x54 bne $t1, $0, loop

0x58 lw $s0, 0($sp)

A:

bne $t1, $0, loop

opcode => bne => 5

rs =>  $t1 => 9

rt => $0 => 0

immediate => loop => -6

So, decimal representation is 5 | 9 | 0 | -6 , and we need to turn it into machine code which is

000101 | 01001 | 00000 | 1111 1111 1111 1010.