

1. Assume that registers \$s0 and \$s1 hold the values 0x80000000 and 0xD0000000 , respectively.

a. What is the value of \$t0 for the assembly code: add \$t0, \$s0, \$s1

b. Is the result in \$t0 the desired result, or has there been overflow?

c. For the contents of registers \$s0 and \$s1 as specified above, what is the value of \$t0 for the following assembly code?

sub \$t0, \$s0, \$s1

d. Is the result in \$t0 the desired result, or has there been overflow?

e. For the contents of registers \$s0 and \$s1 as specified above, what is the value of \$t0 for the following assembly code?

add \$t0, \$s0, \$s1

add \$t0, \$t0, \$s0

f. Is the result in \$t0 the desired result, or has there been overflow?

2. Assume that \$s0 holds the value 128.

a. For the instruction `add $t0, $s0, $s1`, what is the range(s) of values for \$s1 that would result in overflow?

b. For the instruction `sub $t0, $s0, $s1`, what is the range(s) of values for \$s1 that would result in overflow?

c. For the instruction `sub $t0, $s1, $s0`, what is the range(s) of values for \$s1 that would result in overflow?

3. Write the MIPS assembly instruction and its binary encoding to accomplish this task: If the contents of R3 and R4 are equal, skip the next 10 instructions and execute the 11<sup>th</sup>.

Instruction:	Binary equivalent

4. What the final effect of the MIPS instruction 0x3C000088?

5. Assume \$t0 holds the value 0x00101000 . What is the value of \$t2 after the following instructions?

<pre>slt  \$t2, \$0, \$t0 bne  \$t2, \$0, ELSE j    DONE ELSE:     addi  \$t2, \$t2, 2 DONE:</pre>	Value of \$t2 after the code completes:
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6. The following instruction is not included in the MIPS instruction set:

`rpt $t2, loop # if(R[rs]>0) R[rs]=R[rs]-1, PC=PC+4+BranchAddr`

a. If this instruction were to be implemented in the MIPS instruction set, what is the most appropriate instruction format?

b. What is the shortest sequence of MIPS instructions that performs the same operation?

7. Consider the MIPS loop on the right.

a. Assume that the register \$t1 is initialized to the value 10. What is the value in register \$s2 assuming \$s2 is initially zero?

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LOOP: slt $t2, $0, $t1
      beq $t2, $0, DONE
      subi $t1, $t1, 1
      addi $s2, $s2, 2
      j LOOP
DONE:
```

b. Write the equivalent C code routine. Assume that the registers \$s1 , \$s2 , \$t1 , and \$t2 are integers A , B , i , and temp, respectively.

c. Assume that the register \$t1 is initialized to the value N. How many MIPS instructions are executed?

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Rough Work