

**Q1) B. ASSUME YOU HAVE \$t0=[0xCAFEBAFE], HOW CAN YOU CHANGE IT TO**

[0xBABACAF0]

and

[0x03CA1E00]

Using only logic and shift operations.

### **Answer:**

**1-) For \$t0=[0xCAFEBAFE] to [0xBABACAF0]:**

srl \$t1, \$t0, 16 # \$t1 = 0x0000CAFE

sll \$t2, \$t0, 16 # \$t2 = 0xBABE0000

ori \$t1, \$t1, 0x000ACAF0 # \$t1 = 0x000ACAFE

andi \$t2, \$t2, 0xBAB00000 # \$t2 = 0xBAB00000

andi \$t1, \$t1, 0x000ACAF0 # \$t1 = 0x000ACAF0

or \$t0, \$t1,\$t2 # \$t0 = 0xBABACAF0

**2-) For \$t0=[0xCAFEBAFE] to [0x03CA1E00]:**

srl \$t0, \$t0, 8 # \$t0 = 0x00CAFEBA

ori \$t0, \$t0, 0x03000000 # \$t0 = 0x03CAFEBA

andi \$t0, \$t0, 0x03CA1E00 # \$t0 = 0x03CA1E00

**Q2) WHAT MIPS INSTRUCTION IS REPRESENTED BY THE FOLLOWING HEX 0x20090022**

### **Answer:**

We use I-format because of first 6 bits (addi is used with I-format)

We know that for MIPS I-format Instruction:

op: 6 bits, rs: 5 bits, rt: 5 bits, constant: 16 bits

Firstly, we converted hexa to decimal and we found these values:

op: 001000 (addi operation)

rs: 0000 (\$zero)

rt: 01001 (\$t1)

constant: 0000 0000 0010 0010(34)

The result is:

Addi \$t1, \$zero, 34

**Q3) Convert the following java code into MIPS. Write comment for every line of your MIPS instructions.**

```
int i = 32;  
int j = -3;  
while (i>2)  
i--;  
j++;
```

### **Answer:**

```
lw $t0, i           # Load i (32) to register $t0  
lw $t1, j           # Load j (-3) to register $t1
```

```
whileLoop:         # start while loop  
addi $t2, $zero, 2  # load immediate value 2 into $t2  
slt $t3, $t0, $t2    # set $t3 to 1 if i < 2, else 0  
bne $t3, $zero, loopFinish # If $t3 is not equal to zero, jump to loopFinish (i <= 2)  
  
# Loop body  
addi $t0, $t0, -1    # i = i - 1  
addi $t1, $t1, 1     # j = j + 1  
j whileLoop          # (j) Jump back to the start of the loop
```

```
loopFinish:       # loopFinish  
sw $t0, i           # store updated "i" to memory  
sw $t1, j           # store updated "j" to memory
```

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