CSE 3038 – Computer Organization **Spring 2020**
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HW 1 – Due 05 / 05 / 2020 23:30pm (No late submission)

Questions

1. For the following C statement, what is the corresponding MIPS assembly code? Assume that the variables f, g, h, i, and j are assigned to registers $s2, $s3, $s4, $s5, and $s6, respectively. Assume that the base address of the arrays A and B are in registers $s0 and $s1, respectively.

```
B[i+3] = A[i+4*j];
```

2. Show how the value 0xcabd1f2e would be arranged in memory of a little-endian and a big-endian machine. Assume the data is stored starting at address 0.

3. Translate the following C code to MIPS. Assume that the variables f, g, h, i, and j are assigned to registers $s0, $s1, $s2, $s3, and $s4, respectively. Assume that the base address of the arrays A and B are in registers $s6 and $s7, respectively. Assume that the elements of the arrays A and B are 4-byte words:

```
B[i+j+1] = A[i+j-2] + A[i-j+1];
```

4. Provide the type, assembly language instruction, and binary representation of instruction described by the following MIPS fields:
op=0, rs=5, rt=8, rd=20, shamt=0, funct=36.

5. For the following C statement, write a minimal sequence of MIPS assembly instructions that does the identical operation. Assume $t1 = A, $t2 = B, and $s1 is the base address of C.

```
A = C[0] << 8;
```

6. Translate the following C code to MIPS assembly code. Use a minimum number of instructions. Assume that the values of a, b, i, and j are in registers $s0, $s1, $t0, and $t1, respectively. Also, assume that register $s2 holds the base address of the array D.

```
for(j=0; j<a; j++)
    for(i=0; i<b; i++)
        D[2*i] = i + j - 5;
```

7. How many MIPS instructions does it take to implement the C code from Exercise 2.27? If the variables a and b are initialized to 10 and 1 and all elements of D are initially 0, what is the total number of MIPS instructions that is executed to complete the loop?

Notes:

No late submission will be accepted and the questions will be solved during the problem session. Note that a selected subset of these questions will be graded. You should submit through the Canvas system.

For the homework, you have to work alone and submit your own work. In case of any form of copying all parties will get 0 grade.