Test Review 3 Problems, MIPS Pipeline Analysis and Problems

Note: All CLO’s in this problem set tie to ABET program-level criterion a.

Name: ____________________________________________

Below are some additional problems dealing with data and control flow in the MIPS Pipeline. In each problem, show the instruction data and control line flow. If you make a mistake on a problem, copy the spare diagram on the next sheet. Hint: If there is an empty set of brackets on one of the three problem pipeline diagrams ( [ ] ), some data needs to be entered there!

• Problem 1: (CLO 1—Comp. Arch.) Show data and control flow for blt $t9,$t8,loop. Assume $t9 contains 0x f39; $t8 contains 0x f6a. The instruction labeled “loop” is 0x50 instructions farther into program memory than the branch instruction (that is, the instruction labeled “loop” has an address that is 0x50 words, or 0x140 bytes, greater than the branch instruction). The program counter reading for the branch instruction is 0x0040 0290. The information given will enable you to fill in all the actual numerical data required in the diagram. NOTE AT THE BOTTOM OF THE DIAGRAM WHETHER THE BRANCH IS TAKEN (circle the correct answer). Remember to highlight the five (5) control lines which are active.

• Problem 2: (CLO 1—Comp. Arch.) Show data and control flow for sub $t6,$t5,$t4. Assume that $t4 contains 0x0000 0113 and $t5 contains 0x0000 0e2c. This will enable you to show the numerical data flow through the pipeline. Remember to highlight the five (5) control lines which are active.

• Problem 3: (CLO 1—Comp. Arch.) Show data and control flow for sw $s6,48($t5). Assume that $t5 contains 0x1001 0100, and that the data in $s6 is 0x0a396d4e. This will enable you to show the numerical data values through the pipeline. Remember to highlight the three (3) control lines which are active.
MIPS R-2000 Spare Pipeline Diagram
The branch is / is not taken.

blt $t9,$t8,loop
• Problem 2

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sub $t6,$t5,$t4
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• Problem 3:

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sw $s6,48($t5)
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