

York University
Dept. of Computer Science and Engineering
CSE4201
HW 2
Due Oct 18, 2009

1. Consider the following code. Using scoreboard technique and the same assumptions as in the lecture notes.
When each instruction will start execution and ends?

```
L.D      F0, 0(R2)
L.D      F2, 0(R4)
L.D      F4, 0(R6)
ADD      F6, F4, F2
MUL      F8, F6, F0
S.D      F8, 0(R2)
```

2. Consider MIPS pipeline and assume that branches are completely resolved by the end of ID stage. For the following code segment:

```
LD       R1, 0(R2)
DADDI    R1, R1, #1
SD       0(R2), R1
DADDI    R2, R2, #4
DSUB     R4, R3, R2
BNEZ     R4, Loop
```

Show the timing of this sequence without forwarding. Assume that branch is handled by predicting it as not taken. How many cycles does it take for 100 iterations of this loop to execute (counting the filling of the pipeline and emptying of the pipeline)?

Repeat the previous step assuming forwarding. Assume that branch is handled by predicting it as not taken.

Repeat assuming that you can rearrange instructions and schedule branch delay slot.