0907432 Computer Design (Spring 2012)
Quiz 2A Solution

الاسم: رقم التسجيل: رقم الشعبة: 1

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Instructions: Time **10** minutes. Closed books and notes. No calculators. Please answer all problems in the space provided. **No questions are allowed**.

<Good Luck>

For each code sequences below, state whether (*i*) it can execute without stalling or forwarding, (*ii*) it can avoid stalls using only forwarding, or (*iii*) it must stall. Assume that these sequences run on the classical 5-stage pipeline described in Section 4.6 and that branches are resolved in the decode stage.

Sequence 1:
```
lw      $t0, 0($t0)
add     $t1, $t0, $t0
```

  (*iii*) it must stall   *(2.5 marks)*

Sequence 2:
```
add     $t1, $t0, $t0
addi    $t2, $t0, #5
addi    $t4, $t1, #5
```

  (*ii*) it can avoid stalls using only forwarding   *(2.5 marks)*

Sequence 3:
```
addi    $t1, $t0, #1
addi    $t2, $t0, #2
addi    $t3, $t0, #3
addi    $t4, $t0, #4
```

  (*i*) it can execute without stalling or forwarding   *(2.5 marks)*

Sequence 4:
```
add     $t1, $t0, $t0
beq     $t2, $t1, 5
```

  (*iii*) it must stall   *(2.5 marks)*