0907432 Computer Design (Spring 2009)
Quiz 1B

رقم الشعبة: رقم التسجيل: الاسم:

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Instructions: Time **12** minutes. Closed books and notes. No calculators. Please answer all problems in the space provided. **No questions are allowed**.

<center><i><Good Luck></i></center>

Q. A program consists of multiplication operations and other operations. The multiplication operations are sped up by a factor of 5. Using Amdahl's law, find out what should be the fraction of the execution time of the multiplication operations (f) to achieve an overall speed up of 4.

Over all speedup = 1 / ((1-f) + f/s)

4   = 1 / ((1-f) + f/5)

4 - 4f + 4f/5   = 1

3.2 f   = 3

f   = 3/3.2

f   = 0.94

Q. For the data shown in the following table, summarize the relative performance of Machine A using one number.

Benchmark	Machine A Execution Time	Reference Machine Execution Time	**Relative Perf**
1	100 sec	200 sec	**200/100 = 2**
2	100 sec	400 sec	**400 / 100 = 4**
3	200 sec	400 sec	**400 / 100 = 2**
4	150 sec	300 sec	**300 / 150 = 2**

Relative Performance   = $(2 * 4 * 2 * 2)^{1/4}$

Relative Performance   = $(32)^{1/4}$

Relative Performance   = 2.38

Q. Using pipeline diagrams, find how many cycles are needed to execute the following code sequence. Assume full forwarding paths are used plus stalls (when needed), and branch instructions are resolved in the Decode stage with predict not taken.

```
    lw    r1, 0(r2)    F D E M W
    lw    r1, 0(r1)     F D D E M W
    add   r1, r1, r4      F F D D E M W
    sw    r1, 4(r2)        F F D E M W
```

10 Cycles.

<center>**1 of 1**</center>