

C335 Homework #7

Points:	: 40 points
Due Date:	: April 23 rd
Submissions:	: Hardcopy (please type or write your solution clearly)

PART I (10 POINTS)

Using a drawing similar to what we used in lecture notes, show the forwarding paths needed to execute the following four instructions:

```
add    $3, $4, $6
sub     $5, $3, $2
lw      $7, 100($5)
add     $8, $7, $2
```

PART II (10 POINTS)

Identify all of the data dependencies in the following code. Which dependencies are data hazards that will be resolved via forwarding? Which dependencies are data hazards that will cause a stall?

```
add    $3, $4, $2
sub     $5, $3, $1
lw      $6, 200($3)
add     $7, $3, $6
```

PART III (10 POINTS)

Here is a series of address references given as **word** addresses: 2, 3, 11, 16, 21, 13, 64, 48, 19, 11, 3, 22, 4, 27, 6, and 11. Assuming a direct-mapped cache with 16 **one-word** blocks that is initially empty, label each reference in the list as a hit or a miss and show the final contents of the cache.

PART IV (10 POINTS)

Here is a series of address references given as **word** addresses: 2, 3, 11, 16, 21, 13, 64, 48, 19, 11, 3, 22, 4, 27, 6, and 11. Show the hits and misses and final cache contents for a direct-mapped cache with **four-word** blocks and **a total size of 16 words**.