

## HW #5

### CPE 442/CS455

**6.4** - Find the data dependencies in the code. Which dependencies are data hazards that will resolve 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
```

**6.17** - Consider the following code on the pipelined data path of Figure 6.36. At the end of the fifth cycle of execution, which registers are being read and which register will be written?

```
Add  $2, $3, $1
Sub   $4, $3, $5
Add   $5, $3, $7
Add   $7, $6, $1
Add   $8, $2, $6
```

**6.18** – With regard to exercise 6.17, explain what the forwarding unit is doing during the 5<sup>th</sup> cycle of execution. If any comparisons are being made, mention them.

**6.22** – Consider the following code on the pipelined data-path of Figure 6.36:

```
Lw    $4, 100($2)
Sub    $6, $4, $3
Add    $2, $3, $5
```

How many cycles will it take to execute? Draw a diagram like that of Figure 6.34 that illustrates the dependencies that need to be resolved, and provide another diagram like that of Figure 6.35 that illustrated how the code will actually be executed (incorporating any stalls or forwarding) so as to resolve the identified problems.