

Score: \_\_\_\_\_

Name: \_\_\_\_\_

**ECE 3055 Quiz 6 - March 2, 2005**

Assume a 256-entry direct-mapped TLB is used in a system with a 36-bit virtual byte addresses, 32-bit physical memory byte addresses, and 64K byte pages. For the sequence of virtual addresses shown below in hex, state whether each address causes a TLB hit or miss and show the physical address generated. The TLB is initially empty after a power on reset. Assume all listed page table entries are valid. Show the final contents of the TLB after this sequence of addresses is accessed.

**Virtual address sequence**

| <i>Address</i> | <i>Hit/Miss</i> | <i>Physical Address</i> |
|----------------|-----------------|-------------------------|
| 00000203F      | M               | F000 203F               |
| 000003055      | H               | F000 3055               |
| 000020153      | M               | F0F0 0153               |
| 00000017F      | H               | F000 017F               |
| 000022CE2      | H               | F0F0 2CE2               |
| 000022AE3      | H               | F0F0 2AE3               |

1pt. each

**TLB Initial Contents (Empty)**

**TLB Final Contents**

| <i>Block</i> | <i>Valid</i> | <i>Tag</i> | <i>Data</i> | <i>Block</i> | <i>Valid</i> | <i>Tag</i> | <i>Data</i> |
|--------------|--------------|------------|-------------|--------------|--------------|------------|-------------|
| 0            | 0            | X          | X           | 0            | 1            | 000        | F000 ←      |
| 1            | 0            | X          | X           | 1            | 0            | X          | X           |
| 2            | 0            | X          | X           | 2            | 1            | 000        | F0F0 ←      |
| 3            | 0            | X          | X           | 3            | 0            | X          | X           |

2pts. each

**Page Table Initial Contents**

| <i>Virtual Page #</i> | <i>Data</i> |
|-----------------------|-------------|
| 00000                 | F000        |
| 00001                 | E000        |
| 00002                 | F0F0        |
| 00003                 | 3000        |
| ...                   |             |
| 00020                 | 7200        |
| 00021                 | 2000        |
| 00022                 | F000        |
| 00023                 | D200        |