

Fundamentals of Computer Systems

Review for the Final

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The Final

3 hours

8–10 problems

Closed book

Simple calculators are OK, but unnecessary

One double-sided 8.5 × 11" sheet of your own notes

Anything discussed in class *after the midterm* is fair game

Much like homework assignments

Problems will range from easy to difficult; do the easy ones first.

Historical developments & trivia will *not* be on the test.

- ▶ MIPS Architecture/Assembly programming
 - ▶ Computational, Load/Store, & Control-flow Instrs.
 - ▶ Instruction Encoding
 - ▶ Pseudoinstructions
 - ▶ Higher-level constructs; subroutines and recursion
- ▶ MIPS Microarchitecture/Datapaths
 - ▶ Single-Cycle
 - ▶ The datapath for lw, sw, R-type, and branch
 - ▶ The controller: instruction decoding
 - ▶ Processor Performance
 - ▶ Multi-cycle
 - ▶ Constructing the datapath
 - ▶ The FSM controller
 - ▶ Performance Analysis
 - ▶ Pipelined
 - ▶ Basic pipelined datapath and control
 - ▶ Hazards: forwarding, stalling, and flushing
 - ▶ Performance Analysis

- ▶ The Memory Hierarchy: Caches
 - ▶ Memory hierarchy to make it fast & cheap
 - ▶ Temporal and Spatial Locality
 - ▶ Memory performance; hit rate
 - ▶ Direct-mapped caches
 - ▶ n -way set associative caches
 - ▶ Fully associative caches