CSSE 132 – Introduction to Computer Systems
Rose-Hulman Institute of Technology
Computer Science and Software Engineering Department

Exam 1 Review Guide

This exam measures your mastery of these learning objectives:

Objective 1 Describe the functions of common computer system hardware elements including CPU, memory hierarchy and input/output devices.

Objective 2 Use logic gates and a hardware design language like Verilog to implement standard computational structures including memory cells, adders, ALUs, and multiplexers.

Objective 3 Discuss why certain abilities such as information representation, network communication, input/output, and security require support from multiple layers of a computer system.

Objective 4 Demonstrate ability to perform tasks like these in a variety of operating environments including the Linux system environment:

- leverage a version control system
- create and edit files
- command-line (shell) navigation and manipulation

1 Topics to study

- Numbers (Objective 3)

    - Number representation in binary, hexadecimal, and decimal.
    - Conversions from one number system (binary, hex, decimal) to another.
    - Two's complement
    - Operations on binary numbers (bitwise operations, addition, subtraction)

- Logic Design (Objective 2)

    - Truth tables and boolean logic.
    - Combinational logic expressions
    - Sum of products form and creating combination logic expressions from truth tables.
    - Multiplexers and decoders
    - Creating circuit diagrams from combinational logic.
    - Creating an ALU that adds and does other operations.

- Sequential logic (Objectives 1 and 2)

    - Basic Memory Cells
    - Latches and Flip Flops
    - Clocks
    - Building a register file
    - Memory addresses

- Memory Hierarchy (Objectives 1 and 3)

    - Different types of memory (DRAM, SRAM, SSD/Flash, Hard Disk)
    - Disk access time
    - Effective access time (given multiple types of memory and a cache strategy and hit rate)
    - When would you use various types of memory?

- Command Line Interface (Objective 4)

    - Access your Pi using SSH
    - Create and edit files
    - Use Git to obtain, track, and store files and changes.
    - Use basic command line tools (like cd, cat, ls, grep, nano) to navigate, search and manipulate files.