

Princeton University  
COS 217: Introduction to Programming Systems  
Spring 2007 Midterm Exam Preparation

## Topics

*You are responsible for all material covered in lectures, precepts, assignments, and required readings. This is a non-exhaustive list of topics that were covered:*

### Programming assignments

- Concepts used in programming assignments 1, 2, and 3

### C programming

- The program preparation process
- Memory layout: text, stack, heap, data, bss sections
- Data types
- Variable declarations and definitions
- Variable scope, linkage, and duration/extent
- Variables vs. values
- Operators
- Statements
- Function declarations and definitions
- Pointers
- Call-by-value and call-by-reference
- Arrays
- Strings
- Command-line arguments
- Constants: #define, enumerations, "constant variables"
- Input/output functions
- Text files
- Structures
- Dynamic memory management: malloc() and free()
- Void pointers
- Function pointers and function callbacks
- Macros and their dangers (see King Section 14.3)
- The assert() macro

### Programming style

- Modularity, interfaces, implementations
- Programming by contract
- Multi-file programs using header files
- Protecting header files against accidental multiple inclusion
- Opaque pointers
- Abstract data types
- Memory "ownership"
- Preserving invariants

## Applications

- De-commenting
- Lexical analysis via finite state automata
- One-line emacs
- String manipulation
- Symbol tables, linked lists, hash tables
- Dynamically expanding arrays

Tools: The UNIX/GNU programming environment  
UNIX, bash, xemacs, gcc, gdb

## Readings

As specified by the course "Schedule" web page...

Required:

*C Programming* (King): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

*The Practice of Programming* (Kernighan & Pike): 1, 2, 4

Recommended:

*Computer Systems* (Bryant & O'Hallaron): 1

*Programming with GNU Software* (Loukides & Oram): 1, 2, 3, 4, 6

Copyright © 2007 by Robert M. Dondero, Jr.