

# MCS-378 Final Exam

Serial #:

This exam is closed-book and mostly closed-notes. You may, however, use an 8 1/2 by 11 sheet of paper with *hand-written* notes for reference. (Both sides of the sheet are OK.)

Please write your name only on this page. Do not turn the page until instructed, in order that everyone may have the same time. Then, be sure to look at all problems before deciding which one to do first. Some problems are easier than others, so plan your time accordingly. You have 120 minutes to work.

Write the answer to each problem on the page on which that problem appears. You may also request additional paper, which should be labeled with your test number and the problem number.

**If you are stuck, ask for help. At worst, I'll offer to sell you a hint for some points.**

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

Problem	Page	Possible	Score
1	2	12	
2	3	12	
3	4	12	
4	5	12	
5	6	12	
<b>Total</b>		60	

1. [ **12 Points** ] A file system uses inodes like those used in traditional Unix or Linux systems (such as you worked with in a homework problem). However, in this system, each inode has room for 8 direct block pointers, then pointers to single indirect, double indirect, and triple indirect blocks. Each block holds 8KB (i.e., 8192 bytes). Each pointer to a block takes 8 bytes. How big does a file need to be before the triple indirect pointer gets used? (It is OK to just give a formula for computing the answer; you don't need to actually do the arithmetic.)

2. [ **12 Points** ] A disk driver has requests queued for cylinders 170, 280, 100, and 90 in that order. For each of the following disk arm scheduling algorithms, indicate the order in which the requests would be processed, and the total seek distance in cylinders. In each case, assume that the disk head is initially at cylinder 98.
- (a) FCFS
  - (b) SSTF
  - (c) LOOK (initially headed towards lower-numbered cylinders)
  - (d) C-LOOK

3. [ **12 Points** ] When we talked about networking, I presented a simplified stack of protocol layers: application layer, transport layer, network layer, and then a combined link and physical layer. For each of the following, indicate which of the above four layers it corresponds with:
- (a) IP
  - (b) Ethernet
  - (c) HTTP
  - (d) TCP
  - (e) Getting data to another computer on the same network
  - (f) Retransmitting data for which no acknowledgement is received
  - (g) Getting data to another computer on a different network
  - (h) Verifying that a cached web page is up to date
  - (i) Hubs and switches
  - (j) Firewalls that limit access to certain port numbers
  - (k) Proxy caches
  - (l) Routers

4. [ **12 Points** ] Write a brief description of each of three different general kinds of security vulnerabilities that continue to be commonly exploited.

5. [ **12 Points** ] Write a paragraph briefly summarizing one of the papers that we read in the second half of the semester on a networking or distributed-systems topic (content routing support, the Archipelago island-based file system, or the OSU flow-tools package). Do not pick a paper for which you led the discussion. Your summary should state what problem the authors were trying to solve, and what the general nature of their solution is.