

## Problem Set 5

Due May 2nd at 6pm (bonus if submitted before Mon Apr 30th at 6pm)

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

Recitation (# or time): \_\_\_\_\_

# Hours (not including your first reading of the chapters)

required to complete problem set: \_\_\_\_\_

Please type your answers and submit a PDF where the filename has the following format:  
<lastname>-<firstname>.pdf

1. (10 pts) Consider a file system that uses inodes to represent files. Disk blocks are 4 KB in size, and a pointer to a disk block requires 4 bytes. This file system has 16 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system? What percentage of the required storage is overhead if the file is 100K bytes? 1000K bytes?
2. (20 pts) Describe how a log based transactional file system (journaling) is beneficial for networked file systems.
3. (10 pts) Show pseudocode for a function to return the outer and inner index positions for the block indicated by *file\_offset*. Assume that BLOCK\_SIZE is the constant for the number of bytes per block and N\_INDEX is the constant for number of addresses stored in a block.  
*FindBlockAddress(addr file\_offset, addr \*outer\_index, addr \*inner\_index)*
4. (20 pts) Based on the types of threats and security breaches we have covered, what type of security problems are Spectre and Meltdown?
5. (20 pts) Describe two advantages of encrypting data stored in the computer system?
6. (20 pts) Is it always crucial to know that the message you have sent has arrived at its destination safely? If your answer is "yes," explain why. If your answer is "no," give appropriate examples.