Name: _____ (First name first) **Score:** _____

COSC 6360 **QUIZ #1** **SEPTEMBER 14, 2011**

Closed book. You can have with you one single-sided 8½ by 11 sheet of notes. UH expels cheaters

1. How many lines will be printed by the following program? (5 points)

```
main() { fork(); fork(); printf("Done!\n") }
```

Answer: 4 **lines**

2. A Berkeley UNIX file system has a block size of 16 kilobytes. How many blocks of a given file can be accessed :

a) using the block addresses stored in the i-node? (5 points) 12 **blocks**

b) with one level of indirection? (5 points) 16 KB/4 = 4K= 4,096 **blocks**

c) with two levels of indirection? (5 points) 4GB/16KB – 4,096 -12 = 256K- 4,108 **blocks**

3. What is the main purpose of the UNIX ***set user-id*** bit*?* (10 points)

The set user-id bit allows an executable file to run with the user-id—and the privileges—of its owner instead if those of the user executing the file.

4. Where does UNIX store the ***name*** of a file? (10 points)

UNIX stores the name(s) of a file in the directory entry/entries pointing to the i-node of the file.

5. Why did Babaoğlu and Joy decide to limit the speed at which the hand of the clock sweeps the circular list of active pages to 300 pages per second? (10 points)

Under the BSD implementation of the Clock policy, the first reference to any page that had been marked invalid by the Clock hand occasions two context switches. To ensure that t this context switch overhead will never take more than 10% of the total CPU time, Babaoğlu and Joy limited the *speed* at which the hand of the clock sweeps the circular list of active pages to 300 pages per second.

Total: ____/50

6. What makes the choice of a block size for a file system so difficult? (10 points) How did the Unix Fast File System (FFS) solve that issue? (10 points)

- Most file systems contain a large number of small files as well as a significant number of large and very large files. The block sizes that would be the most effective for large files would create an excessive amount of internal fragmentation when they are used to store to small—and very small—files.

- UNIX FFS requires a minimum block size of 4 KB but allows blocks to be divided into 2, 4, or 8 fragments that can be used to store small files and the tails of larger files.

7. The Unix Fast File System used synchronous updates for all metadata updates.

a) What is the ***main advantage*** of this approach? (10 points)

It guarantees that the file system will remain in a consistent state after a crash and ensures the immediate durability of metadata updates.

b) What is its ***main disadvantage***? (10 points)

Blocking metadata updates result in numerous seeks that slow down the file system..

8. What is the main motivation for ***cylinder groups***? (10 points)

Since each cylinder group contains both a fragment of the i-node table, subdividing a disk partition into cylinder groups eliminates most long seeks between the i-node table entries and the blocks they point to.

Total: ____/50