On my honor, I/we have not given, nor received,
nor witnessed any unauthorized assistance on this work.

Name/Signature: _____

Name/Signature: _____

Name/Signature: _____

Name/Signature: _____

Name/Signature: _____

Question:	1	2	3	Total
Points:	10	14	16	40
Score:				

1. (10 points) Consider a file in the Unix file system named `/a/b/c`. How many reads of data blocks are required to find the i-node number of this file? You may assume that all i-nodes are cached in memory and that each directory file is one block long. In your answer, describe the purpose of each disk read.

2. Consider the case where a link (hard or soft) is made from an existing file or directory, A, to a new file or directory, B. Mark if each statement is true of hard links (H), soft (symbolic) links (S), both (B), or neither (N).

   (a) (2 points) _____ When B is created, the reference count in the i-node of A is incremented.

(b) (2 points) _____ When the contents of A are changed, the contents of B change as well.

(c) (2 points) _____ When the contents of B are changed, the contents of A change as well.

(d) (2 points) _____ When A is removed (e.g., with `rm A`), B still exists.

(e) (2 points) _____ When B is removed (e.g., with `rm B`), A still exists.

(f) (2 points) _____ A and B can be directories.

(g) (2 points) _____ Can be used to create cycles in the directory hierarchy.

3. Consider a UNIX file system with 12 direct pointers, 1 indirect pointer, 1 double-indirect pointer, and 1 triple-indirect pointer in the i-node. Assume that disk blocks are 8K bytes and that each pointer to a disk block requires 4 bytes.

   (a) (8 points) What is the largest possible file that can be supported with this design? Show the expression to get full credit, **don't** calculate the final numeric answer!

(b) (8 points) How many disk reads will this file system require to read block 14 of the file named `/a` assuming nothing is cached? Further, you can assume that the root directory contains very few entries (i.e., is one block long). For full credit, describe each disk read.