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

Print name and sign: _____

Question:	1	2	3	4	5	6	Total
Points:	5	5	4	3	8	5	30
Score:							

1. (5 points) Describe what a socket is and how it is used for inter-process communication.

> **Solution:** A socket is one endpoint of a two-way communication link between two programs (i.e., processes) running on the network. This allows a process on one computer (e.g. a web browser) to communicate with another process (e.g a web server) on another computer.
>
> A socket is essentially a combination of an IP address (identifies the computer) and a port number (identifies the specific program the data should be routed to by the OS).

2. (5 points) Draw a picture (with both numerical and textual descriptions) of the file descriptor table after the following commands execute in order. You may assume there are no syntax errors and the program runs to completion.

```
open("myfile.txt");
open("data.txt");
close("myfile.txt");
open("quiz.txt");
```

> **Solution:** Remember that stdout, stdin, and stderr exist by default (ie, you don't have to create them) for any process. Those occupy the first 3 entries in the file descriptor table. Also remember that open slots will immediately be filled by the next file to open. This results in myfile.txt (in slot 3) being replaced by quiz.txt. After myfile.txt is closed, quiz.txt is the next file to open.
>
> ```
> 0    stdin
> 1    stdout
> 2    stderr
> 3    quiz.txt
> 4    data.txt
> ```

3. (4 points) List 6 different pieces of information contained in an inode (as you explored them in your filesystems lab).

> **Solution:** Any six are fine. Descriptions of fields would be fine. For example, you would receive full credit for an answer such as "whether the file is a file or a directory".
>
> Below is an inode from your lab exploration, but you can also see Figure 40.1 in your textbook.
>
> ```
>   File: demo.c
>   Size: 6327        Blocks: 16        IO Block: 4096    regular file
> Device: 10300h/66304d    Inode: 13632529    Links: 1
> Access: (0644/-rw-r--r--)  Uid: (    0/    root)   Gid: (    0/    root)
> Access: 2020-04-18 18:02:55.488000000 +0000
> Modify: 2019-12-04 16:47:54.000000000 +0000
> Change: 2020-04-18 18:02:55.488000000 +0000
>  Birth: -
> ```

4. (3 points) Describe the difference between a hard and soft link.

> **Solution:** See 39.14 and 39.15 (pages 17-20 of OSTEP Ch. 39)

5. (8 points) Describe how the VerySimpleFileSystem (as discussed during this sprint) would find and open a file at the path `/a/b/c.txt`.

> **Solution:** Read root directory inode (at known location)
> Read root dir's data block
> Find inode number mapping for directory `a`
> Read a's inode.
> Read a's data block
> Find inode number mapping for directory `b`
> Read b's inode.
> Read b's data block
> Find inode number mapping for `c.txt` Read c.txt's inode.
> Read c.txt's data block

6. List and describe an advantage of:

(a) (2 points) a decentralized network

> **Solution:** no central point of failure
> network can adapt to a single computer or region which fails/is overwhelmed.

(b) (3 points) packet switching

> **Solution:** increases overall efficiency
> allows network to react to congestion/failures
> improves reliability