Name: _____ USC ID: _____

INF 551 – Fall 2016 (Morning)

Quiz 3: RAID + file systems (10 points)

10 minutes

1. [5 points] Consider the following RAID-4 setup, and a random workload comprising the writing of blocks #4 and #13. Suppose all five disks are identical with random bandwidth of **10MB/s**. Recall that the size of the block is 4KB. Assume the **subtractive** method is used to update the parity.

Disk 0	Disk 1	Disk 2	Disk 3	Parity
0	1	2	3	P0
4	5	6	7	P1
8	9	10	11	P2
12	13	14	15	P3

   a. [3 points] How much time (ignoring the latency) is needed to complete the workload?

$$T = \frac{4KB}{10MB/s} \times 2 \times 2 = 1.6ms$$

   b. [2 points] What is the throughput of this RAID-4 for random write (please give specific value, not the generic value based on N and R)?

$$S = \frac{1}{2} \times R = \frac{10\text{MB/s}}{2} = 5MB/s$$

2. [5 points] Consider a file "file1" of the size 1KB. Suppose we execute the following two commands in sequence: "ln file1 file2", "ln -s file2 file3".

   a. [2 points] What will be the size of file2 and file3 as reported by the "stat" command?

   file 2: 1KB

   file 3: 5 bytes

   b. [3 points] Which of the 3 files have the same inode number? Explain your answer.

   File1 and file2 will have the same inode number. File2 is a hard link and it creates another name for the same file in the directory of the file the name is supposed to link to (file1).