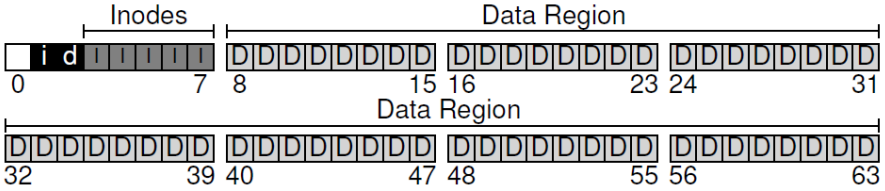
Name: _____ USC ID: _____

INF 551 – Fall 2017 (Afternoon section)

Quiz 3: File Systems (10 points), **15 minutes**

1. Consider a file system which organized the blocks in a storage device as follows (similar to what you saw in class). But here we assume that each inode occupies **1KB**. The block size remains to be 4KB and the sector size 512B.



   a. [2 points] What are the size (in bits) of the inode bitmap and data bitmap?

   Number of files that can be stored is 5*4KB/1KB = 20
   Number of blocks that can be used to store data is 64-8=56
   So inode bitmap is 20bits, and data bitmap is 56bits

   imap = # inodes = 5 × size of block / size of inode = 5 × 4KB/1KB = 20

   dmap = # data regions = 64 − 8 = 56.

   b. [3 points] Which sector stores the inode for the file whose inumber = **15**? (Note that the number of sectors starts from 0.) Which block is the sector located in?

   Address is 3*4KB+15*1KB=27KB
   Sector number is 27KB/512B = 54
   Block number is floor(54/(4KB/512B)) = 6

   Sector number = (addr. first data block + block size × inumber) / sector size = (3×4KB + 4KB×15) / 512B = (3×4KB + 1KB×15) / 512B = 27KB/512B = 54

   Sector is for tracking inodes. Nothing to do with data. PPT 36.

   Block & sector

2. Consider a system call: int fd = open("/foo/bar/beers.txt", O_RDONLY) where RDONLY means read-only. Assume the file "beers.txt" already exists. Fill in the table below with "read" or "write", one entry per line. (Note that there may be more lines than needed.)

	inode bitmap	data bitmap	root inode	foo inode	bar inode	beers.txt inode	root data	foo data	bar data	beers.txt data
open()			r							
							r			
				r						
								r		
					r					
									r	
						r				
										X