

**In-Class Problems: Disk I/O**

Suppose that a server has a single disk drive and one single-core processor. A total of  $k$  processes are running in the system. Each process, if it were running alone in the system, would issue a request to retrieve a 4KB ( $2^{12}$  bytes) block of data from the disk after every 5 milliseconds of run time on the CPU.

The disk drive has 1024 ( $2^{10}$ ) tracks and a total capacity of 128 MB ( $2^{27}$  bytes). According to the manufacturer, the drive's average seek time is 5 milliseconds, and the disk spins at 100 rotations per second.

**Q1:** Suppose that  $k = 1$ . Estimate the CPU utilization, i.e. the fraction of the time that the CPU is not idle.

**Q2:** Repeat Q1, assuming that  $k = 2$ .