

## Exam revision

**Question 1.** The diagram below represents a RAID-5 disk array with three disks, labeled A, B, and C. The shaded blocks are parity blocks. The first byte of each stripe's data on each disk is shown in hexadecimal, except that disk B has just failed, so its data is represented by question marks. After disk B is rebuilt, what will be the value of the first byte of data in stripe five on disk B? (Give your answer in hexadecimal.)

	disk A	disk B	disk C
stripe 0	45 ...	?? ...	3D ...
stripe 1	85 ...	?? ...	A1 ...
stripe 2	F1 ...	?? ...	93 ...
stripe 3	3B ...	?? ...	92 ...
stripe 4	3A ...	?? ...	86 ...
stripe 5	57 ...	?? ...	D2 ...
stripe 6	82 ...	?? ...	7A ...
stripe 7	AC ...	?? ...	38 ...
⋮	⋮	⋮	⋮

**Question 2.** Suppose a 1 GB file is stored on a modern disk drive attached to a computer. The disk is *not* a solid state drive. Assume the 1GB file has not been accessed since the computer was last rebooted, so none of the file's contents is stored in the operating system's file system cache. Which of the two tasks A or B described below is likely to take longer? Justify your answer with a detailed calculation.

- Task A: Read a total of 4 kB from the file in the following manner. Select 4 random locations in the file, and read 1 kB sequentially from each of the 4 locations.
- Task B: Read a total of 100 kB from the file in the following manner. Select one random location in the file, and read 100 kB sequentially from that location.

**Question 3.** Consider a computer that has 8 GB of physical memory and uses a 48-bit virtual address space. The computer uses pages of size 2 kB.

- (a) How many bytes of logical memory are available to each process running on the computer?
- (b) How many frames are available in the memory system?
- (c) How many bits are there in a physical address, and what is the size of the frame and offset fields in the physical addresses?
- (d) How many bits are there in a logical address, and what is the size of the page and offset fields in the logical addresses?