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All questions count equally. Final grade = max(midterm, PART 1) + PART 2

PART 1

1. Give a short explanation of what the following UNIX system calls do.

   - waitpid
   - kill
   - stat
   - link
   - getpid

2. What is the difference between cooked mode and raw mode for input? Which one would you use for an editor (e.g., emacs) and why?

3. Explain how a virtual machine (e.g. VM/370) works.

4. The aging algorithme with a = 1/2 is used to predict execution times. The four previous times are 30, 50, 60, and 70 msec (30 msec is the oldest and 70 msec is the youngest). Which execution time is predicted?

5. Explain how the MINIX scheduler works.

PART 2

6. The disk driver gets requests for blocks on cylinders 12, 20, 1, 44, 6, en 38 in that order. Before the first request comes in the disk head is on cylinder 20. If a seek operation takes 5 msec per cylinder, how much seek time is needed for

   (a) First-come first-served
   (b) Elevator algorithm (initial direction: upwards)

   Ignore rotation time.

7. A computer uses the second chance algorithm to replace pages. There are 8 memory pages, A through H. For each page, the load time and the R and M bits a given below. If a page has to removed, which one is chosen?

Pagina	A	B	C	D	E	F	G	H
Laadtijd	7	10	13	19	21	22	25	29
R bit	1	1	0	1	0	0	1	1
M bit	0	1	1	0	0	1	1	0

8. MINIX uses a block cache. Explain its use and how it works.

9. The UNIX fsck program runs after a crash to repair the file system. It makes a list of blocks by inspecting all the i-nodes. It also looks at the free list to see which blocks are free. After the first crash, it finds situation (a). After the file system has been repaired, it crashes again given the result of (b). Which is worse and why?

0 1 2 3 4 5 6 7 8	Bloknr	0 1 2 3 4 5 6 7 8
1 0 1 1 1 0 0 1 1	Blokken in gebruik	1 0 1 1 2 0 0 1 1
0 1 0 0 0 2 1 1 0	Vrije blokken	0 1 0 0 0 1 1 1 0
(a)		(b)

10. File A consists of the following disk blocks: 6 8 2 7 ...