

Quiz 7 (Nov 11, 2025)

Name: NetID (e.g., ap191):
ANSWER

Please write your answers clearly and keep them brief.

Problem	Score
Question 1	/ 2
Question 2	/ 2
Question 3	/ 1
Total	/ 5

1. Name a device that WeensyOS interacted with (i.e., accessed) using MMIO. [2 points]

The console/screen

2. A process P is running on an operating system that uses copy-on-write to reduce `fork()`'s overhead. Process P forks process Q . After forking, P writes to address $0x25020$, and Q reads from address $0x28004$. In the following parts, for each of the virtual page number provided, say whether the page table entry is marked read-only (i.e., the R-bit is set to 0) or as read-write (R-bit set to 1).

Your answer should assume that both accesses have completed (i.e., after values have been read or written) but no other accesses have been attempted. ($0.5 \times 4 = 2$ points)

- (i) Virtual page number 0x25 in process P . **Read-write:** P wrote, and so the kernel must have copied and updated the bit.
- (ii) Virtual page number 0x28 in process Q . **Read-only:** reads do not cause a page fault.
- (iii) Virtual page number 0x32 in process Q . **Read-only:** all pages are marked as RO on fork.
- (iv) Virtual page number 0x28 in process P . **Read-only.**

3. In class, we discussed how thread contexts could be switched in userspace. Can you switch between processes in userspace? If not, why? [1 point]

No, one cannot modify CR3 from userspace.

