- CPSC 275: Introduction to Computer Systems

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Fall 2025

- Syllabus
- Schedule
- Resources
- Upload
- Solution

Homework 31

NOTE: You are not required to hand in the following exercises, but you are strongly encouraged to complete them to strengthen your understanding of the concepts covered in class.
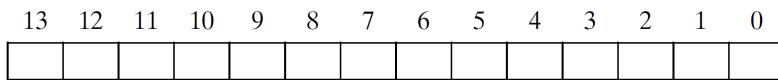
1. Given a 32-bit virtual address space and a 24-bit physical address, determine the number of bits in the VPN, VPO, PPN, and PPO for the following page sizes P:

P	No. VPN bits	No. VPO bits	No. PPN bits	No. PPO bits
1K				
2K				
4K				
8K				

2. Show how the example memory system in Lecture 30 translates a virtual address into a physical address and accesses the cache. For the given virtual address, indicate the TLB entry accessed, physical address, and cache byte value returned. Indicate whether the TLB misses, whether a page fault occurs, and whether a cache miss occurs. If there is a cache miss, enter "–" for "Cache byte returned." If there is a page fault, enter "–" for "PPN" and leave parts C and D blank.

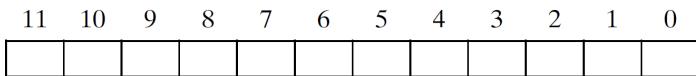**Virtual address**: `0x03d7`

    A. Virtual address format

13	12	11	10	9	8	7	6	5	4	3	2	1	0

    B. Address translation

Parameter	Value

VPN	
TLB index	
TLB tag	
TLB hit? (Y/N)	
Page fault? (Y/N)	
PPN	

C. Physical address format

11	10	9	8	7	6	5	4	3	2	1	0

D. Physical memory reference

Parameter	Value
Byte offset	
Cache index	
Cache tag	
Cache hit? (Y/N)	
Cache byte returned	

3. Repeat Exercise 2 for the virtual address `0x027c`.

4. Repeat Exercise 2 for the virtual address `0x0040`.

- **Welcome: Sean**

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