CS451/551/ECE441/541 - Advanced Computer Architecture
Assignment #5 - Fall 2023

1. (This is problem B.13, P. B-65 from the textbook) A program is running on a computer with a four-entry fully associative (micro) translation lookaside buffer (TLB) (Figure B.33):

Virtual Page Number	Physical Frame Number	Entry Valid?
5	30	1
7	1	0
10	10	1
15	25	1

Figure B.33 - TLB Contents

The following is a trace of virtual page numbers accessed by a program. For each access indicate whether it produces a TLB hit/miss and, if it accesses the page table, whether it produces a page hit or fault. Put an X under the page table column if it is not accessed (Figures B.34 and B.35).

Virtual Page Index	Physical Frame Number	Present
0	3	Y
1	7	N
2	6	N
3	5	Y
4	14	Y
5	30	Y
6	26	Y
7	11	Y
8	13	N
9	18	N
10	10	Y
11	56	Y
12	110	Y
13	33	Y
14	12	N
15	25	Y

Figure B.34 - Page Table Contents

Virtual Page Accessed	TLB (hit or miss)	Page Table (hit or miss)
1		
5		
9		
14		
10		
6		
15		
12		
7		
2		

Figure B.35 - Page Access Trace