

BIRKBECK, UNIVERSITY OF LONDON

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# Computer Systems Coursework1

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## Answers

1. First

- (a) 1 LOAD r3, M  
 2 LOAD r0, #1  
 3 LOAD r1, #1  
 4 LOAD r2, #1  
 5 SUB r3, r3, #1  
 6 ADD r4, r1, r0  
 7 MUL r4, r4, r2  
 8 LOAD r0, r1  
 9 LOAD r1, r2  
 10 LOAD r2, r4  
 11 BNE 5, r3, #3 // jump to instruction 5 if r3 not equal to 3  
 12 STOR M, r2

where # indicates immediate addressing and BNE stands for "branch if not equal"

(b) other point

(c) The table 1 is an example of referenced L<sup>A</sup>T<sub>E</sub>X elements.

	IF	ID	IW	RR	EX	WB	Comments
1	2	3	4	5	6	7	This is a long explanation
2	7	78	5415	5	6	7	
3	545	778	7507	5	6	7	
4	545	18744	7560				
5	88	788	6344				
6	88	788	6344				

Table 1: Table to test captions and labels

2. 15 ns =  $15 \times 10^{-9}$  seconds  
 85 ns =  $85 \times 10^{-9}$  seconds  
 10 ms =  $1 \times 10^{-2}$  seconds

Probability of being in main memory is 0.7 and cache hit ratio is 0.4.  
Therefore time to load is:

$$0.7 \times 1 \times 10^{-2} + 0.3 \times (0.4 \times 15 \times 10^{-9} + 0.6 \times 85 \times 10^{-9})$$