

CoE 353H: Honors Advanced Computer Architecture
Test #2 Solution
April 11, 2002

1. a) $AC2R1: AC \leftarrow R$
 $AC2R2: AC \leftarrow AC + R$
- b) $AC2R1 = A_7A_6'A_5'A_4'A_3'A_2'A_1'A_0'T_3$
 $AC2R2 = A_7A_6'A_5'A_4'A_3'A_2'A_1'A_0'T_4$
- c) $RBUS = (\text{Original value of } RBUS) \vee AC2R1 \vee AC2R2$
 $ACLOAD = (\text{Original value of } ACLOAD) \vee AC2R1 \vee AC2R2$
 $ALUS1 = (\text{Original value of } ALUS1) \vee AC2R2$
 $ALUS3 = (\text{Original value of } ALUS3) \vee AC2R1 \vee AC2R2$

2. a) $NEW1: DR \leftarrow M, AC \leftarrow AC + 1$
 $NEW2: AC \leftarrow AC + DR$
 $NEW3: AC \leftarrow AC + 1$

b)

Address	State	SEL	Micro-operations	ADDR
1010	NEW1	0	DRM, ACIN	1011
1011	NEW2	0	PLUS	****
****	NEW3	0	ACIN	0000

Note: **** = 2-7, 13, or 15

3.

Address	Data	Address	Data
0000	0001	1000	0101
0001	0010	1001	0110
0010	0011	1010	0111
0011	0100	1011	1000
0100	0011	1100	0111
0101	0100	1101	1000
0110	0101	1110	1001
0111	0110	1111	1010

4. a)

Location	Way 1	Way 2
0	0010	0000
1	0001	0011
2	0002	5432
3	0013	0003
F	423F	000F

- b) 0000; 0001; 0002; 423F; 4240; 0003; **0002**; 0010; 0011; 0000;
0001; 0123; **0002**; **0011**; 000F; **0000**; 0013; 5432; 0003; **0002**

Hits shown in bold

Hit ratio = $6/20 = 30\%$