1. RAM

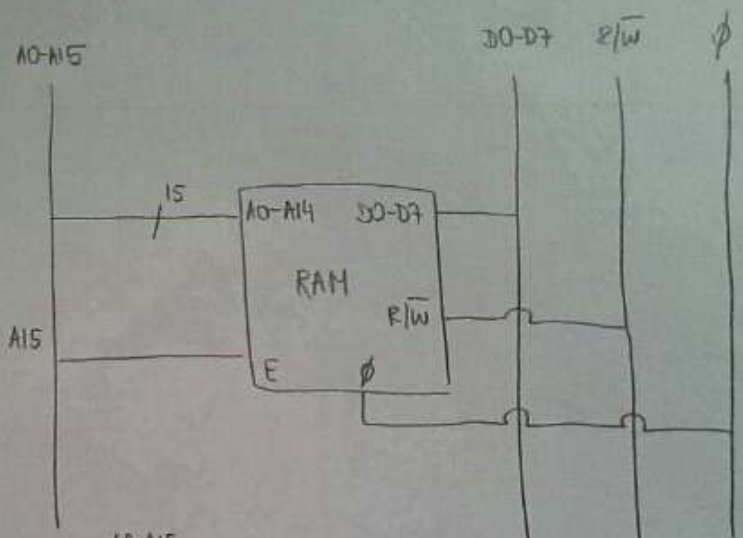
$32\,KB = 32 \cdot 2^{10} = 2^{15}$

E

a) 1111 1111 1111 1111
- 0111 1111 1111 1111

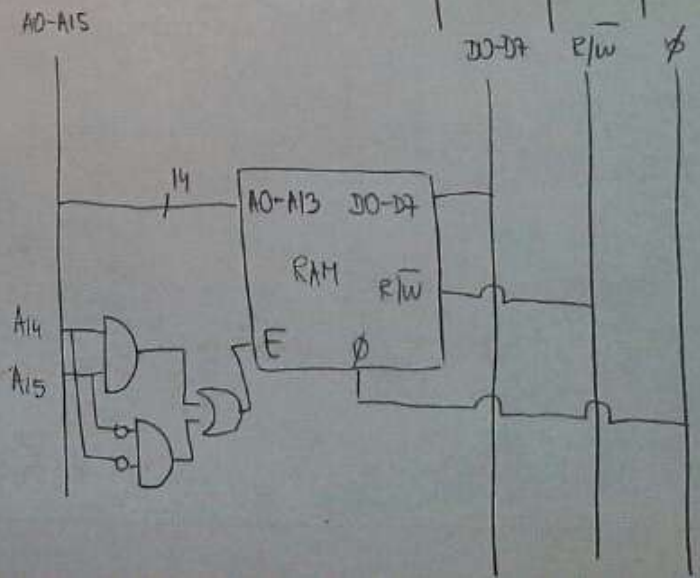
1000 0000 0000 0000

1000 0000 0000 0000
- 1111 1111 1111 1111



b) 1. polovica: 0000 0000 0000 0000
- 0011 1111 1111 1111

2. polovica 1100 0000 0000 0000
- 1111 1111 1111 1111



2.

a) | operacijski kod instrukcije | odredišni registar | registar | usputna konstanta |

5 bitova | 5 bitova | 5 bitova | 17 bitova (16+1 za predznak)

ADD R7,R7,R7 → xxxxx00111 00111 00000000000000

op.kod odr.reg reg konstanta

ADDI R7,R7,1FFFF → xxxxx00111 00111 11111111111111111

b) ADD R7,R7,R7

R7 početno = 1FFFF

```
  0001 1111 1111 1111 1111
+ 0001 1111 1111 1111 1111
-------------------------
  0011 1111 1111 1111 1110
```

R7 = 0011 1111 1111 1111 1110

R7 = $3FFFE

ADDI R7,R7,1FFFF

konstanta se predznačno proširuje

```
  0001 1111 1111 1111 1111
+ 1111 1111 1111 1111 1111
-------------------------
1 0001 1111 1111 1111 1110
```

R7 0001 0001 1111 1111 1111 1110

R7 = $11FFFE

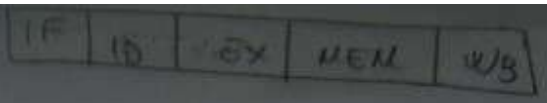
3) shr X M(x) ← M(x) >> 1

IZVRŠI:

1. MAR ← MDR[23:0]
2. MDR ← M(MAR)
3. A ← MDR
4. A ← shr(A)
5. MDR ← A
6. M(MAR) ← MDR

1. $C_5 = (\varphi_8 + \varphi_9) I_8$
   $C_{13} = \varphi_9 I_8$
2. $C_3 = (\varphi_{10} + \varphi_{11}) I_8$
   $C_{14} = \varphi_{11} I_8$
3. $C_5 = (\varphi_{12} + \varphi_{13}) I_8$
   $C_{10} = \varphi_{13} I_8$
4. $C_{17} = \varphi_{14} I_8$
5. $C_7 = (\varphi_{15} + \varphi_{16}) I_8$
   $C_{14} = \varphi_{16} I_8$
   $C_4 = (\varphi_{17} + \varphi_{18}) I_8$

4) MIPS

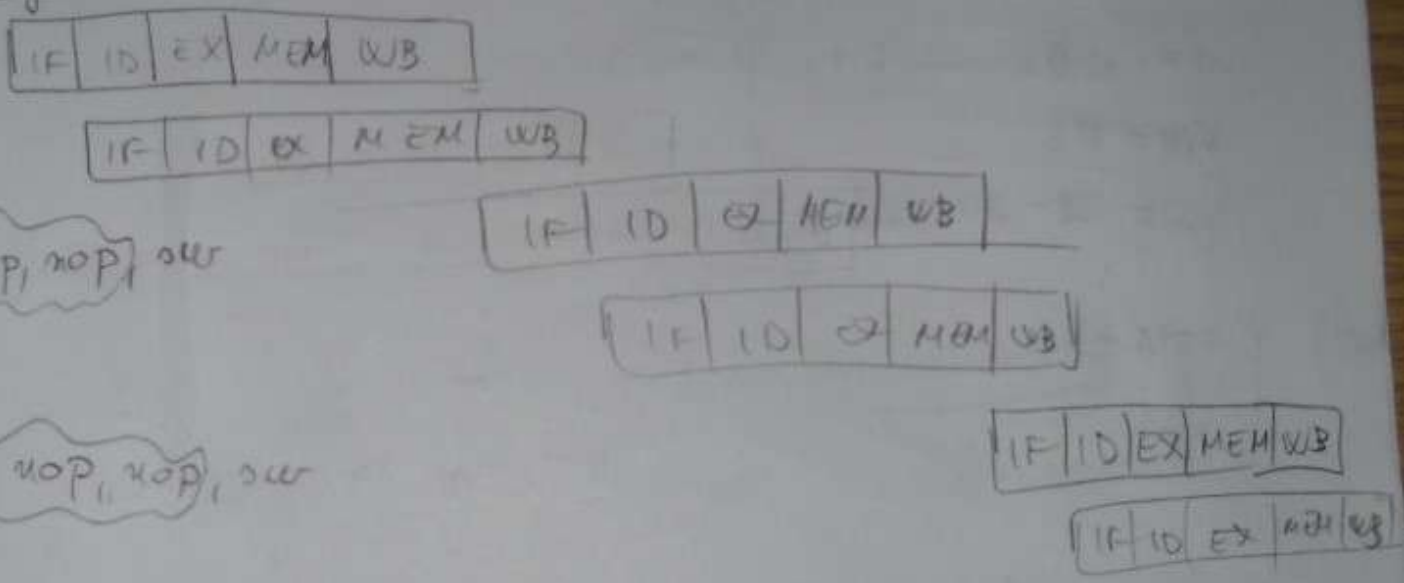



```
lw   $r1, 2($r6)
add  $r6, $r2, $r2
sw   $r6, 2($r1)
lw   $r5, -8($r5)
sw   $r5, -8($r5)
add  $r5, $r5, $r5
```

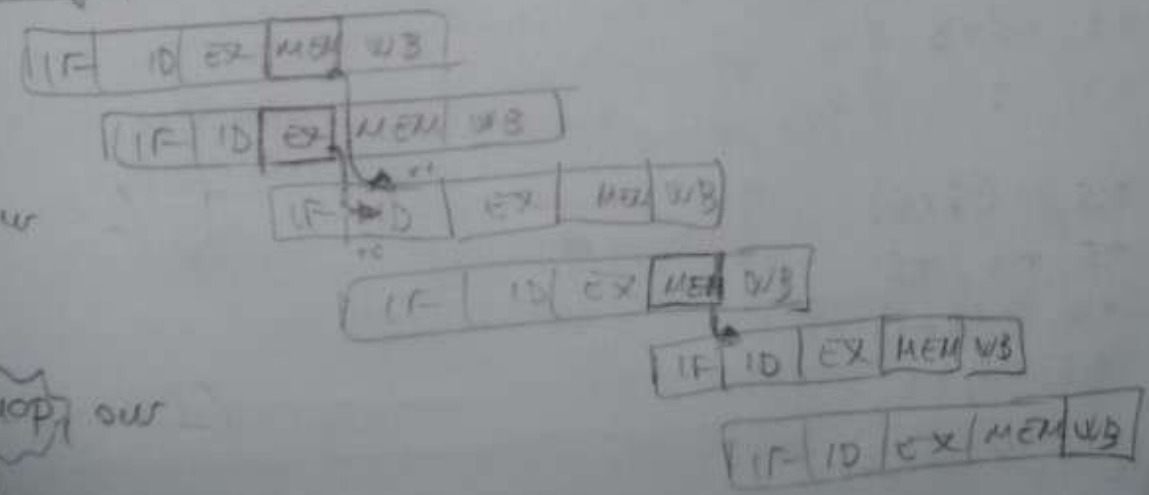
WAR $r6 — RAW $r1 — RAW $r6

RAW $r5 — RAW $r5 — WAR $r5

1er prolj.



2a prolj.



5) a) $\frac{1GiB}{4KiB} = 2^{18}$ → BROJ STRANICA

$|ST| = 2^{18} \cdot 4B = \boxed{2^{20}B}$

b) NE ZNAM, TU SAM VJEROJATNO IZGUBILA BODOVE.

Pokušaj: $|SIM| = 256 \cdot 6B$ (imenik)

$|ST| = 2^{20}B$ (isto kao u a))

Ukupno = $|SIM| + |ST|$

6. SKALARNI

```
    MOVE R0, #64
    MOVE R1, #$a
    MOVE R2, #$b
    MOVE R3, #$c
    LD R4, 0($s)
LOOP: LD R5, 0(R1)
    LD R6, 0(R2)
    MUL R5, R4, R5
    ADD R5, R6, R5
    SW 0(R3), R5
    ADD R1, R1, #2
    ADD R2, R2, #2
    ADD R3, R3, #2
    SUB R0, R0, #1
    JNZ LOOP
```

VEKTORSKI

```
    MOVE R0, #4
    MOVE R1, #$a
    MOVE R2, #$b
    MOVE R3, #$c
    LD R4, 0($s)
LOOP: LDV X0, 0(R1)
    LDV X1, 0(R2)
    MULVS X0, R4
    ADDV X0, X1, X0
    SWV 0(R3), X0
    ADD R1, R1, #64
    ADD R2, R2, #64
    ADD R3, R3, #64
    SUB R0, R0, #1
    JNZ LOOP
```