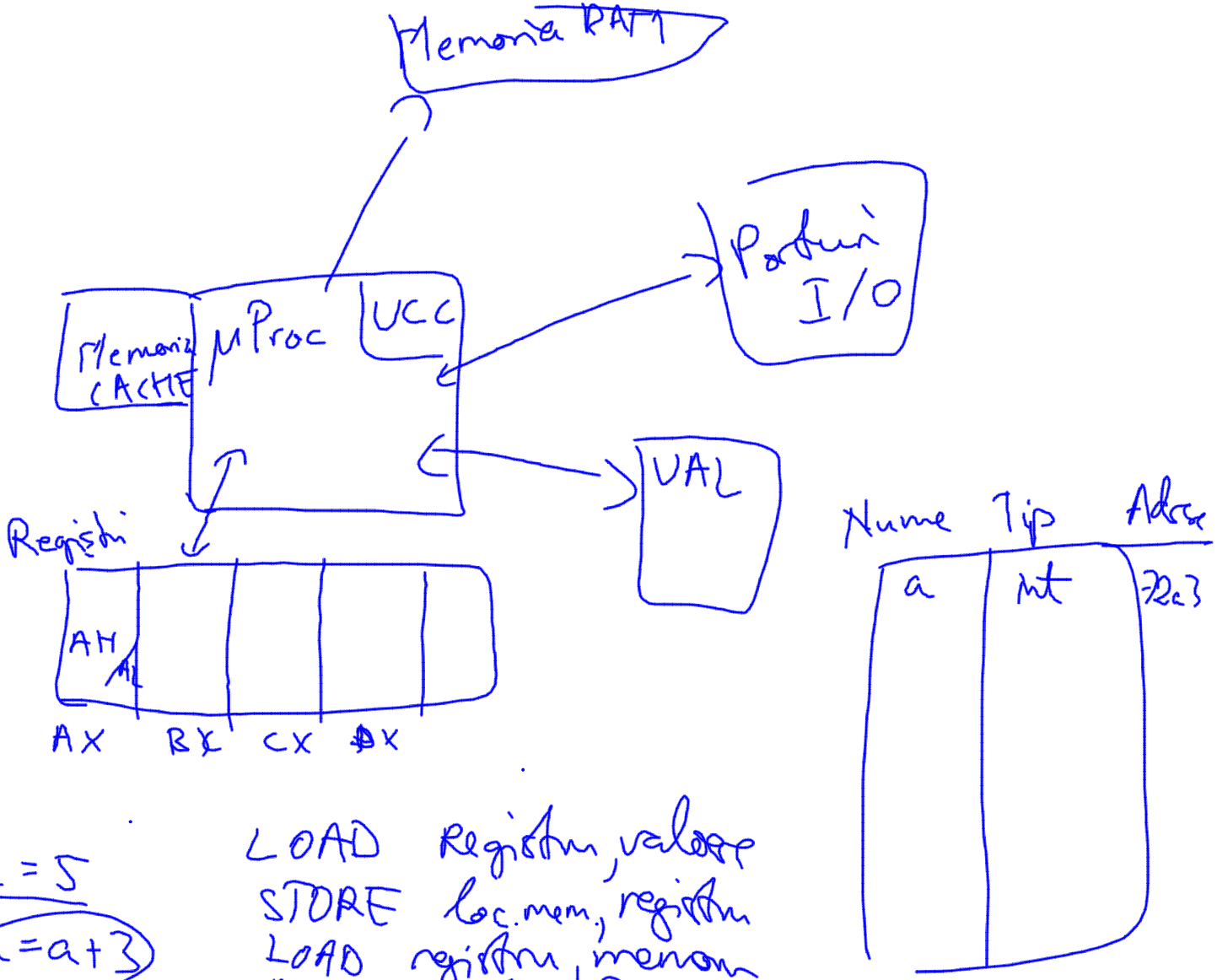


$a = 5$

$a = a + 3$

LOAD Registru, valoare
STORE loc.mem., registru
LOAD registru, memorie
ADD registru, [illegible]
STORE [illegible]

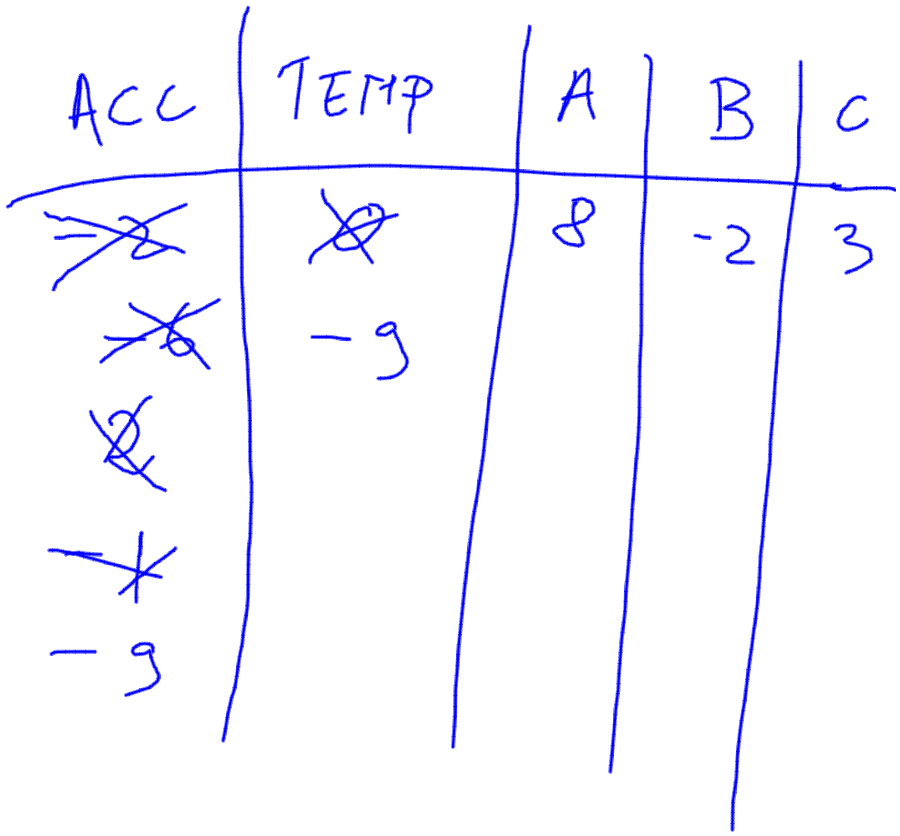
```
for (i = 1; i <= n; i++)
    S = S + i;
```

i	adr1
S	adr2
n	adr3

```
load  AX, 1
store adr1, AX
et1:  load  BX, adr3
      sub   AX, BX
      jgz   out:
      load  AX, adr2
      load  BX, adr1
      add   AX, BX
      store adr2, AX
      load  AX, adr1
      inc   AX
      store adr1, AX
      jp    et1
out:
```

After the following program is executed, what value is in location TEMP?

```
TEMP    DC      0
A       DC      8
B       DC      -2
C       DC      3
        LOAD    B
        MULT    C
        ADD     A
        DIV     B
        SUB     A
        STORE   TEMP
```



WTF DTPD for N=3 → ce e in A?

răsp: 5

```
                READ    N
A               DC      1
START           LOAD    N
                SUB     =1
                BE      RSLT
                STORE   N
                LOAD    A
                ADD     =2
                STORE   A
                BU      START
RSLT            END
```

A ← A+2

N	A	Acc
~~3~~	~~1~~	~~3~~
~~2~~	~~3~~	~~2~~
1	5	~~1~~
		~~0~~

A ← (N−1)×2+1

2N − 1

If the following program has an input value of N, what is the final value of X which is computed? Express X as a mathematical expression in terms of N.

```
        READ    X
        LOAD    X
TOP     SUB     =1
        BE      DONE
        STORE   A
        MULT    X
        STORE   X
        LOAD    A
        BU      TOP
DONE    END
```

N	X	A	Acc
4	4	3	4
	12	2	3
	24	1	2
			1
			0

cibole x

a = x - 1

while(a)

{ x ← x * a

a--;

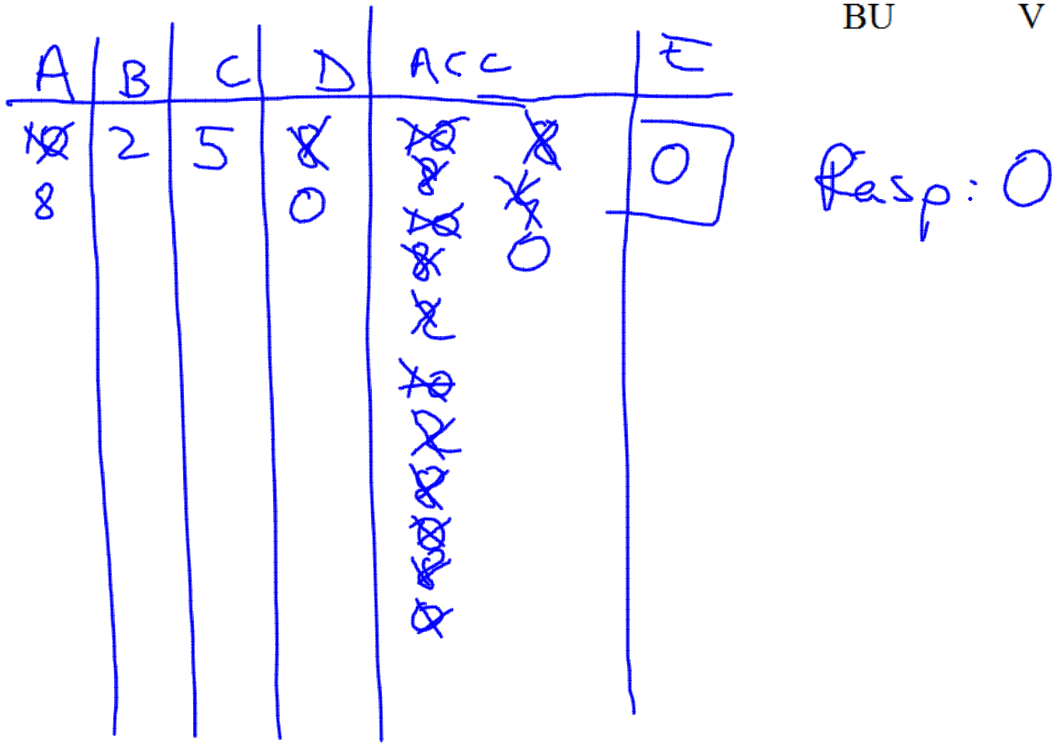
}

<=> x = n!

5. Assembly Language

What is the final value of E when the program is run?

```
A   DC    10      T   LOAD  A     P   LOAD  A
B   DC    2           SUB   D         SUB   B
C   DC    5           BE    U         STORE A
D   DC    8       V   LOAD  A         BU    R
    LOAD  A           DIV   B     S   LOAD  B
    SUB   B           ADD   C         ADD   C
    BG    P           MULT  D         STORE B
R   LOAD  B           STORE E         BU    T
    MULT  C           LOAD  E     U   LOAD  D
    SUB   D           PRINT E         SUB   D
    BL    S           END             STORE D
                                      BU    V
```



1. Recursive Functions

Find $f(16)$ given:

$$f(x)=\begin{cases} f(x-3)-f(x-1) & \text{if } x>5 \\ 2x-1 & \text{if } x\le 5 \end{cases}$$

$f(16)=f(13)-f(15)=28$

$f(13)=f(10)-f(12)=0$

$f(10)=f(7)-f(9)=13$

$f(7)=f(4)-f(6)=11$

$f(6)=f(3)-f(5)=-4$

$f(15)=f(12)-f(14)=28$

$f(14)=f(11)-f(13)=-15-0=-15$

$f(9)=f(6)-f(8)=-2$

$f(8)=f(5)-f(7)=-2$

$f(12)=f(9)-f(11)=-2+15=13$

$f(11)=f(8)-f(10)=-15$

1. Recursive Functions

Find $f(16)$ given:

$$f(x)=\begin{cases} f(x-3)-f(x-1) & \text{if } x>5 \\ 2x-1 & \text{if } x\le 5 \end{cases}$$

x	$f(x)$
3	5
4	7
5	9
6	−4
7	11
8	−2
9	−2
10	13
11	−15
12	13
13	0
14	−15
15	28
16	−28

2. **Recursive Functions**

Find $f(f(f(13)))$ given:

$$f(x)=\begin{cases} f(x-2)+1 & \text{if } x>8 \\ 2*f(x-1)-2 & \text{if } 5\le x\le 8 \\ x-1 & \text{if } x<5 \end{cases}$$

x	$f(x)$
4	3
5	4
6	6
7	10
8	18
9	11
10	19
11	12
12	20
13	13

$f(f(f(13))) = 13$

13

13

3. Computer Number Systems
Solve for X_{16}:

$$2_{10} * X_{16} - 464_8 = 11101110_2 - X_{16}$$

$3X_{(16)} = 11101110_{(2)} + 10011010_{(2)}$ Răsp: B6

$464_{(8)} = 100\,110\,100 +$
$\quad\quad 1110\,1110$
$3X = 10\,0010\,0010$
$\quad\quad 512 \quad 32 \quad 2$

$3X = 546$

$X = 182 = B6$

182	16
16	11
22	
16	
6	

4. Computer Number Systems

What is the next integral decimal number after 328_{10} to have the substring 0110 appear in its binary representation?

328 -
256

= 72 -
64

8

256	128	64	32	16	8	4	2	1
1	0	1	0	0	1	0	0	0

1 001
1 010
1 011
1 100

R: 332