What Do the execute() Methods of These Instructions Do?

ADD

LE

PUSHNUM

PUSHSTATADDR

PUSHLOCADDR

LOADFROMADDR

SAVETOADDR

WRITESTRING

JUMP

JUMPONFALSE

Execution of **ADD** *by:*

```
--ESP;
EXPRSTACK[ESP-1] += EXPRSTACK[ESP];
```

stk frame offset	CURRENTLY EXECUTING METHOD ACTIVATION'S STACKFRAME (Part of Data memory)
⋮	
-1	
0	
+1	
+2	
+3	
⋮	

FP

DATA MEMORY	
TJ.data[0]	
TJ.data[1]	
TJ.data[2]	
⋮	

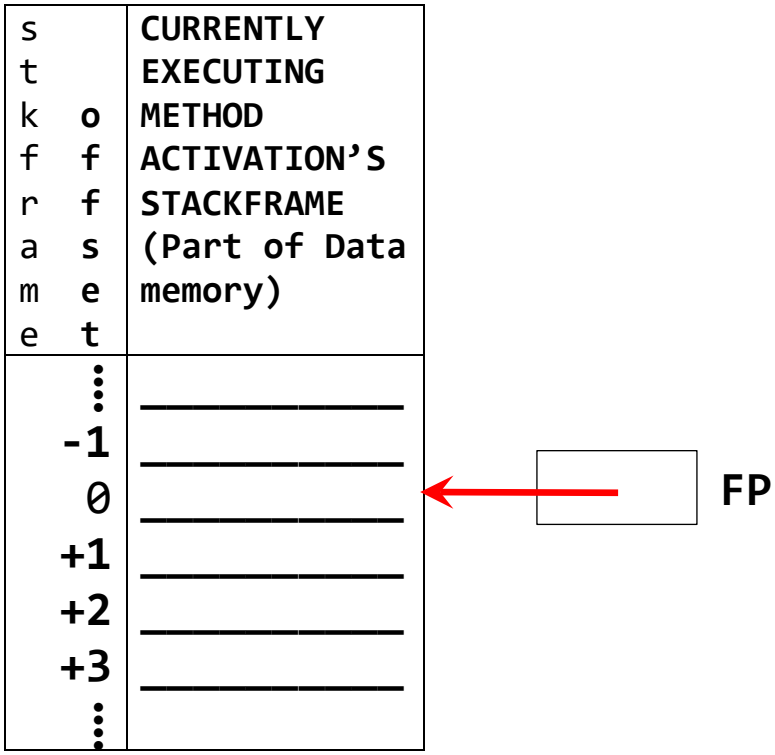
EXPRSTACK	
???	
⋮	
???	
7	EXPRSTACK[3]
9	EXPRSTACK[4]

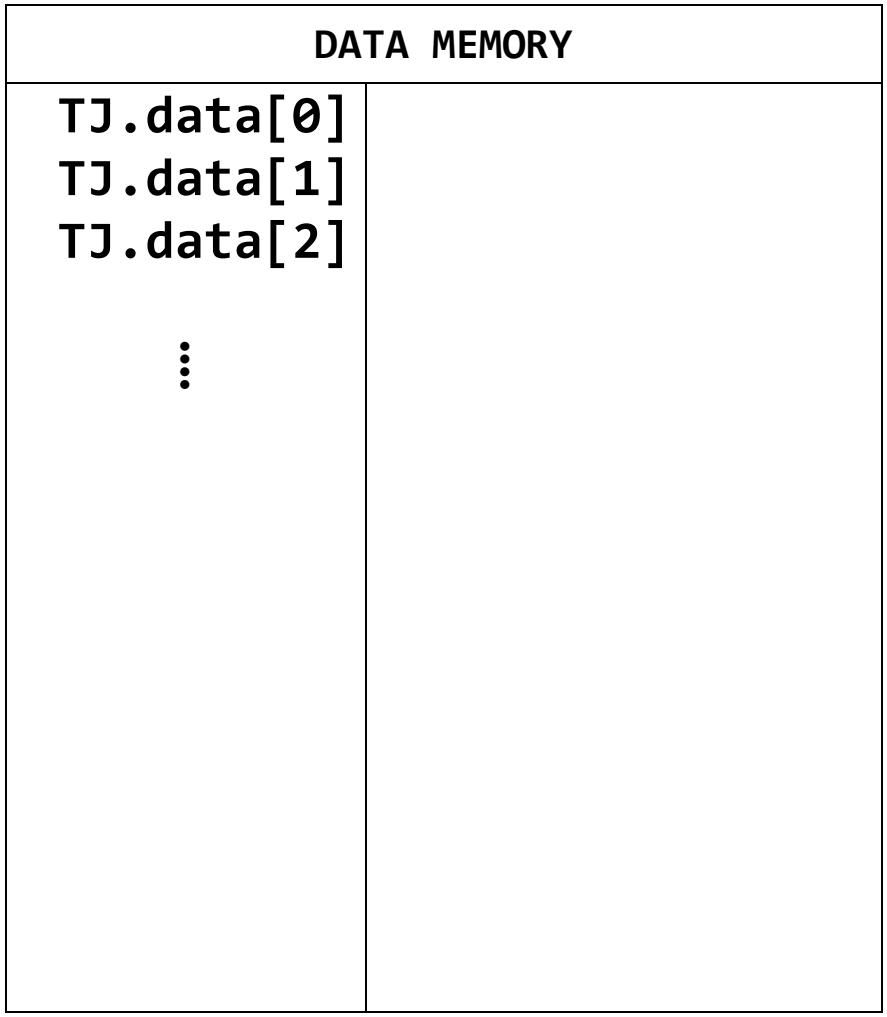
5 ESP

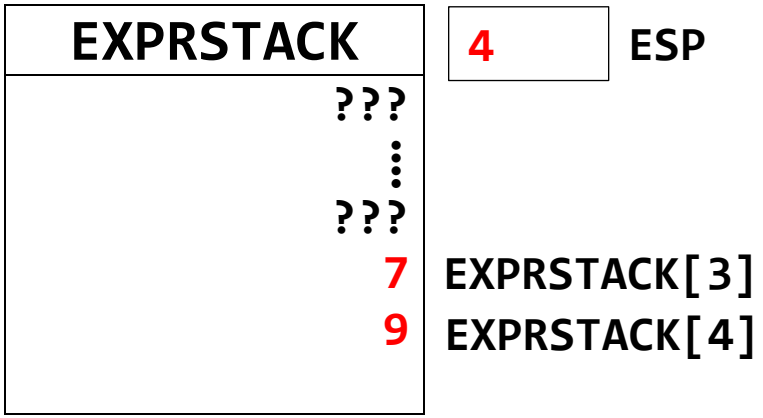
Before execution of
`--ESP;`

Execution of **ADD** *by:*

```
--ESP;
EXPRSTACK[ESP-1] += EXPRSTACK[ESP];
```





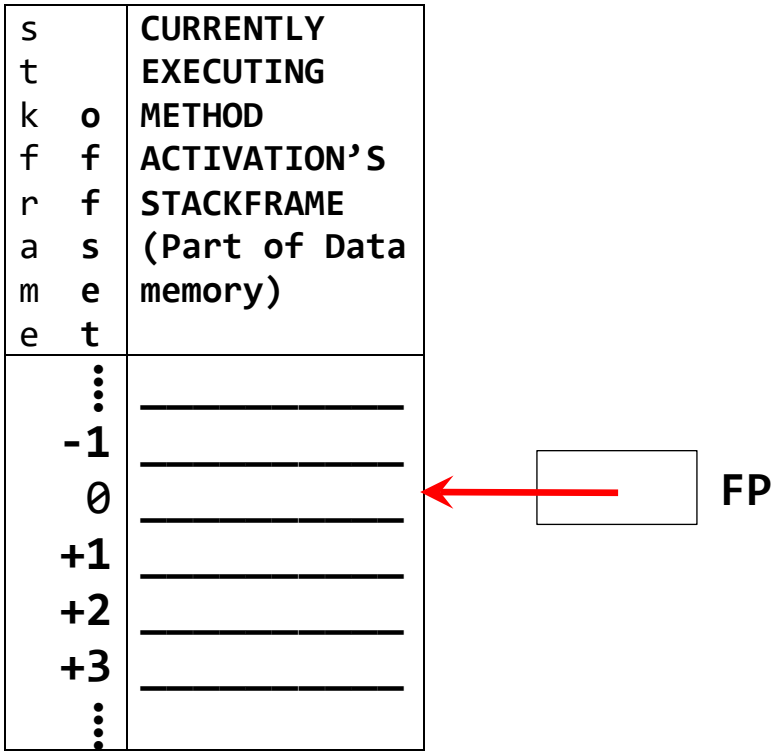


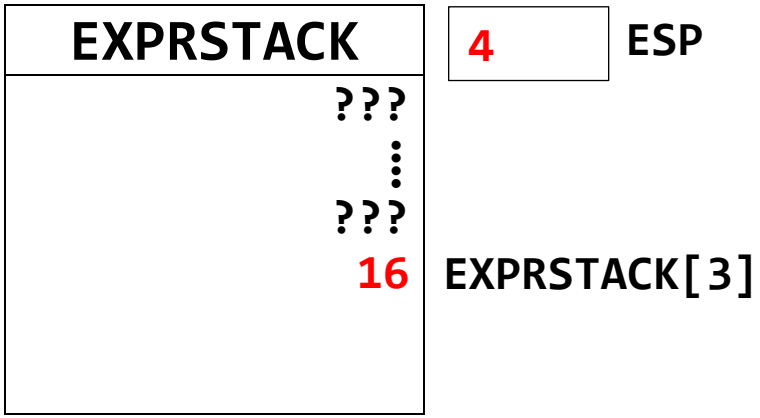
4 ESP

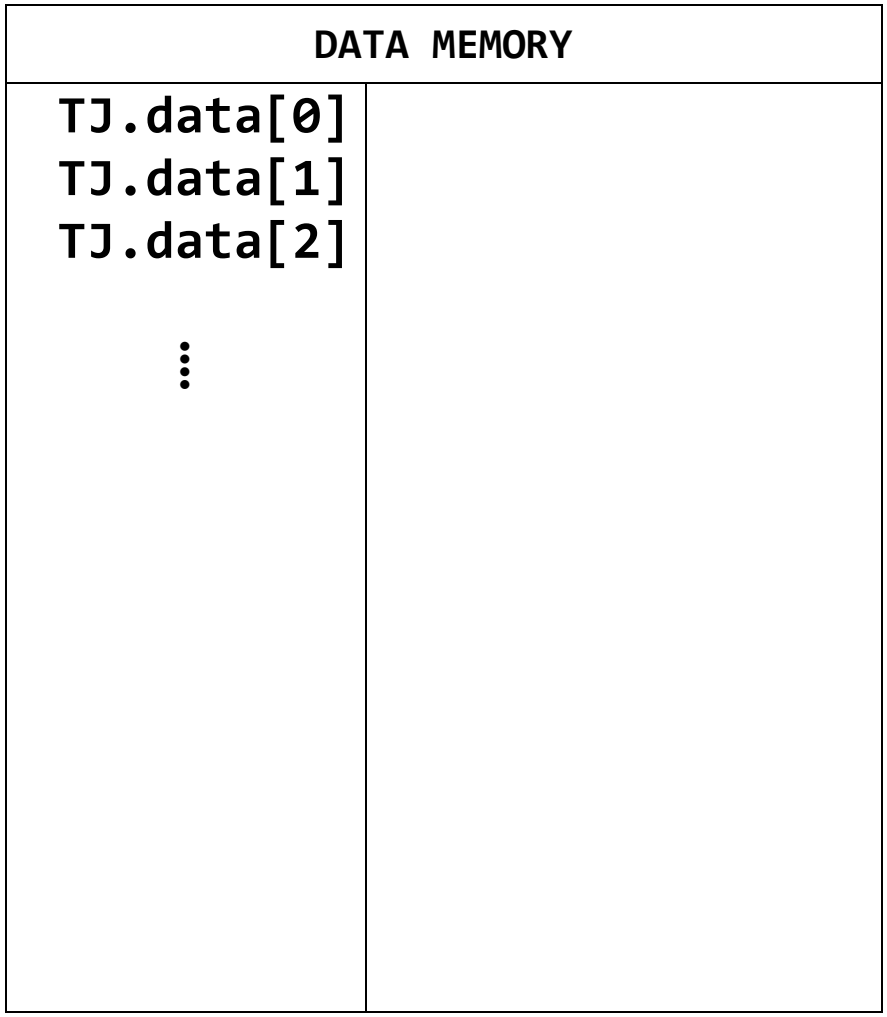
After **execution of**
--ESP;

Execution of **ADD** *by:*

```
--ESP;
EXPRSTACK[ESP-1] += EXPRSTACK[ESP];
```





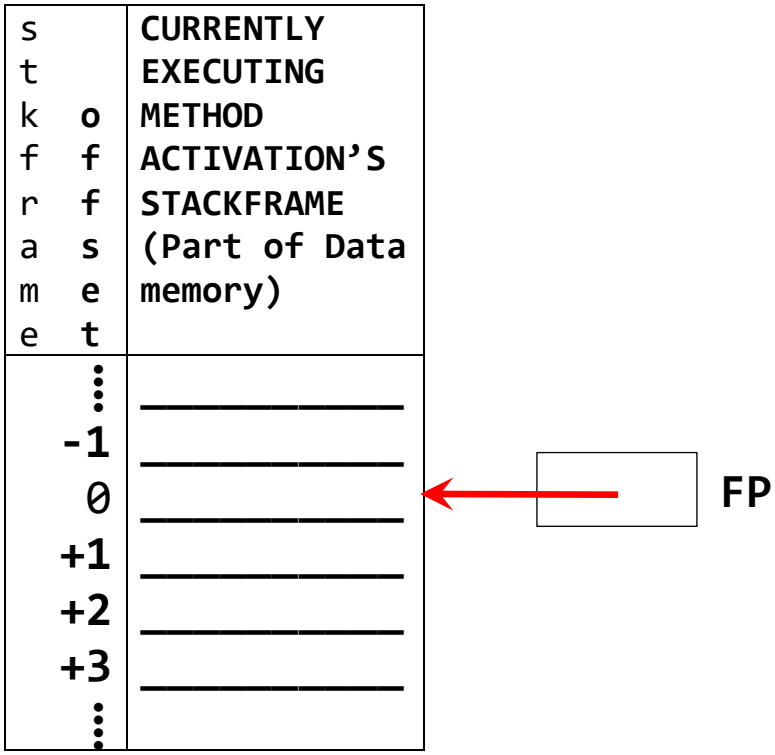


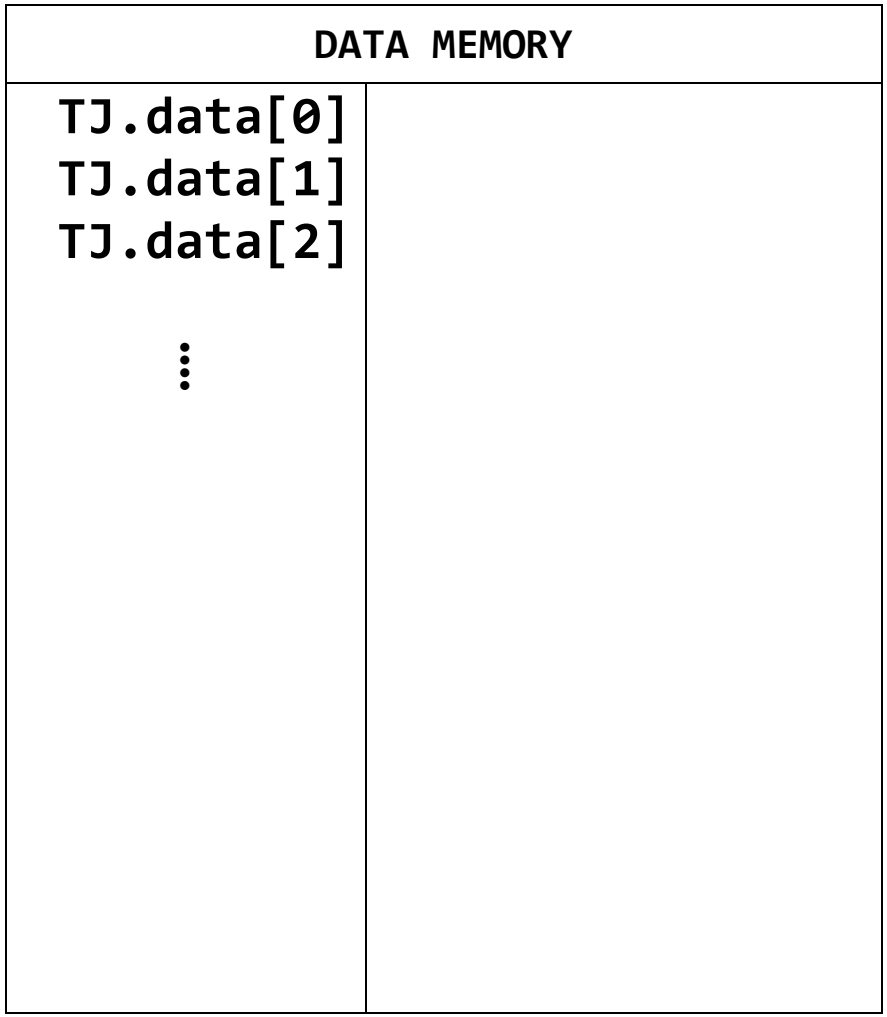
After **execution of**

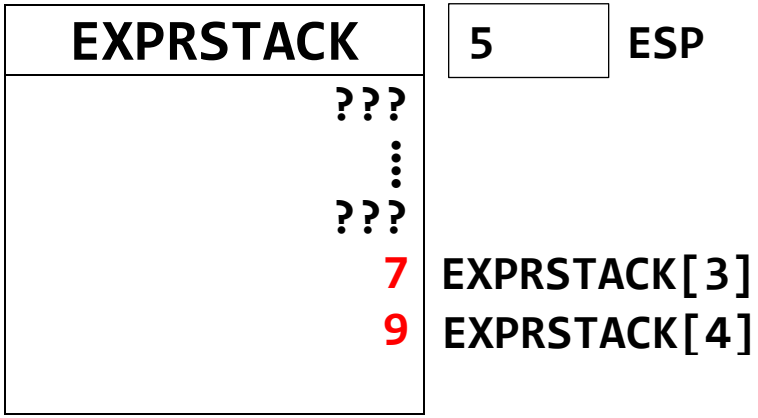
```
EXPRSTACK[ESP-1] += EXPRSTACK[ESP];
```

Execution of **LE** *by:*

```
EXPRSTACK[--ESP-1] = (EXPRSTACK[ESP-1] <= EXPRSTACK[ESP]) ? 1 : 0;
```



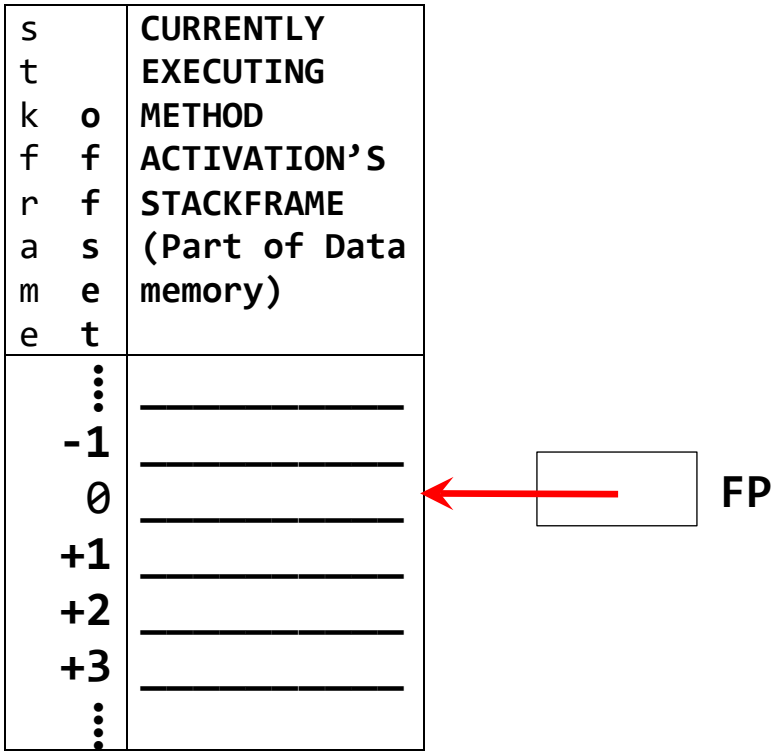


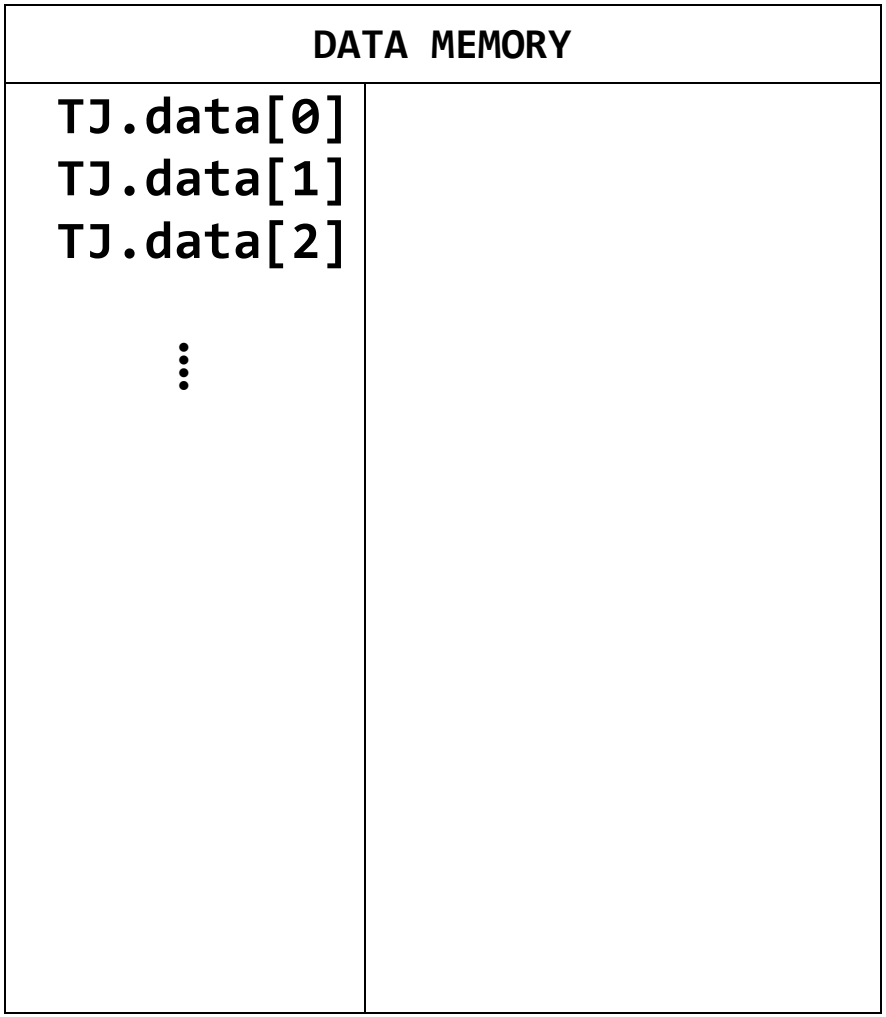


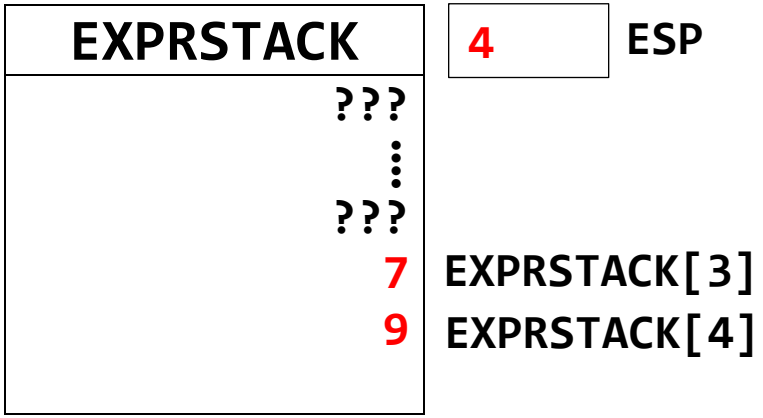
Before evaluation of `--ESP`

Execution of **LE** *by:*

```
EXPRSTACK[--ESP-1] = (EXPRSTACK[ESP-1] <= EXPRSTACK[ESP]) ? 1 : 0;
```



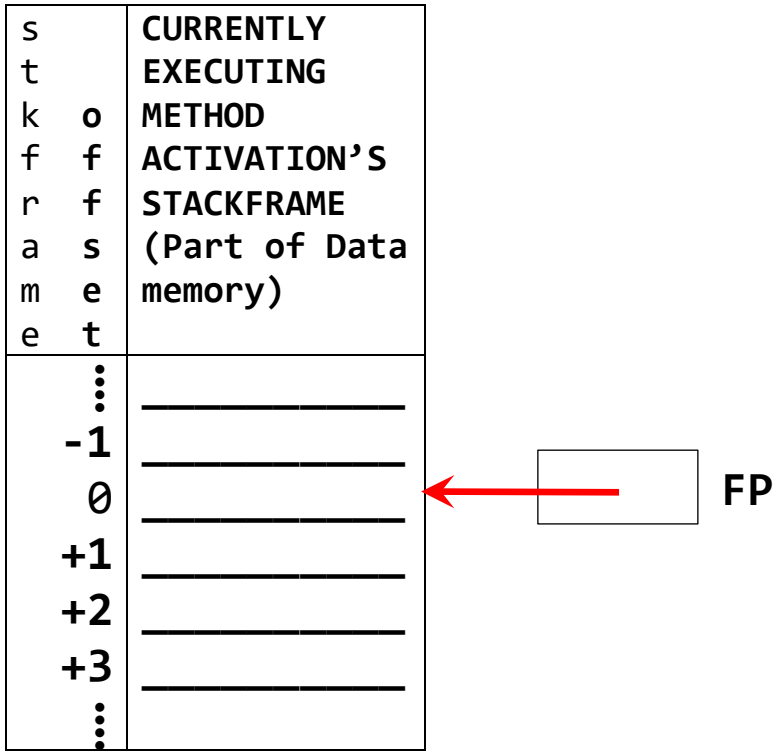


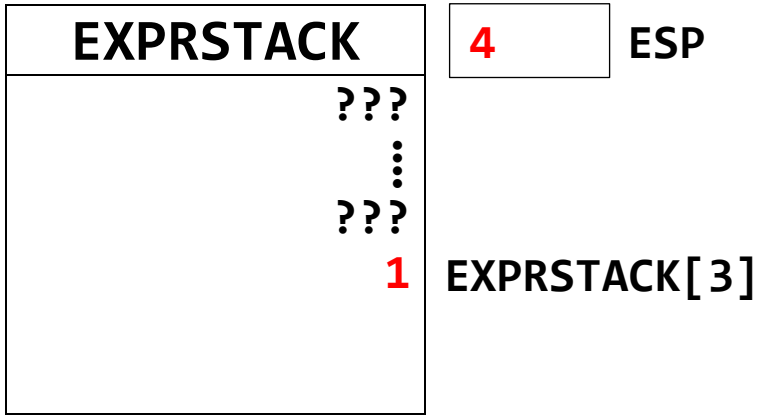


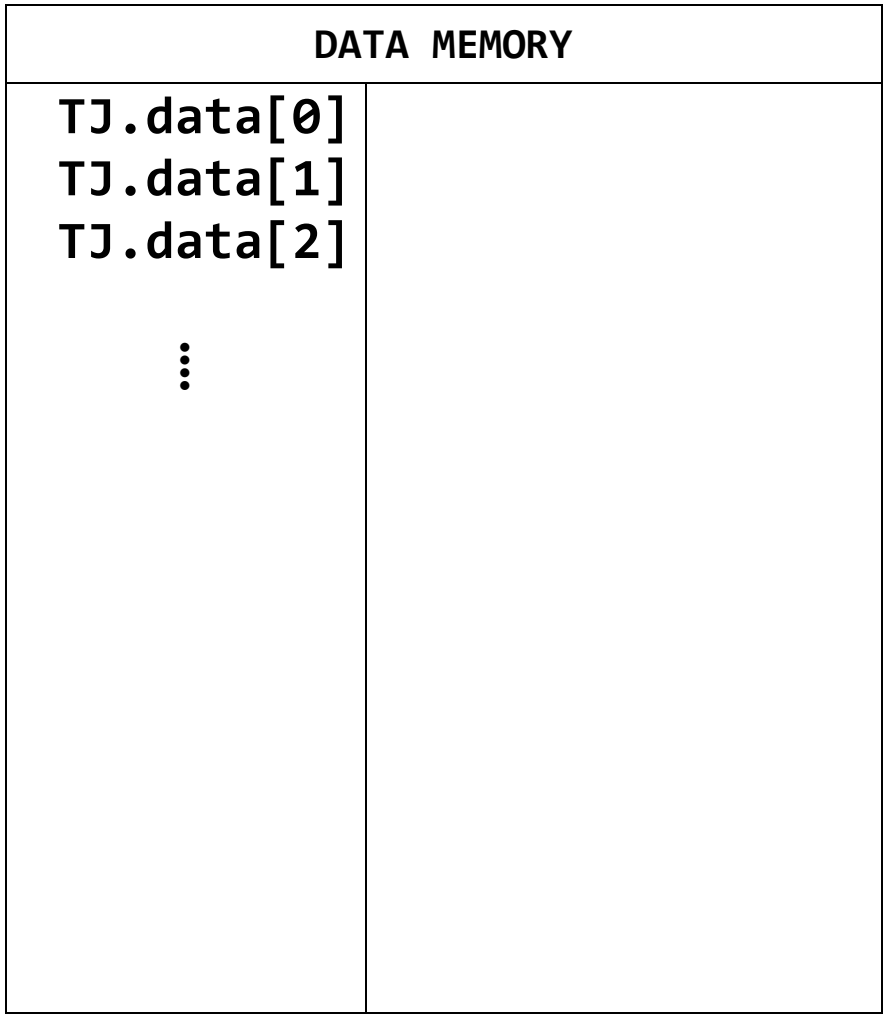
After **evaluation of**
--ESP

Execution of **LE** *by:*

```
EXPRSTACK[--ESP-1] = (EXPRSTACK[ESP-1] <= EXPRSTACK[ESP]) ? 1 : 0;
```



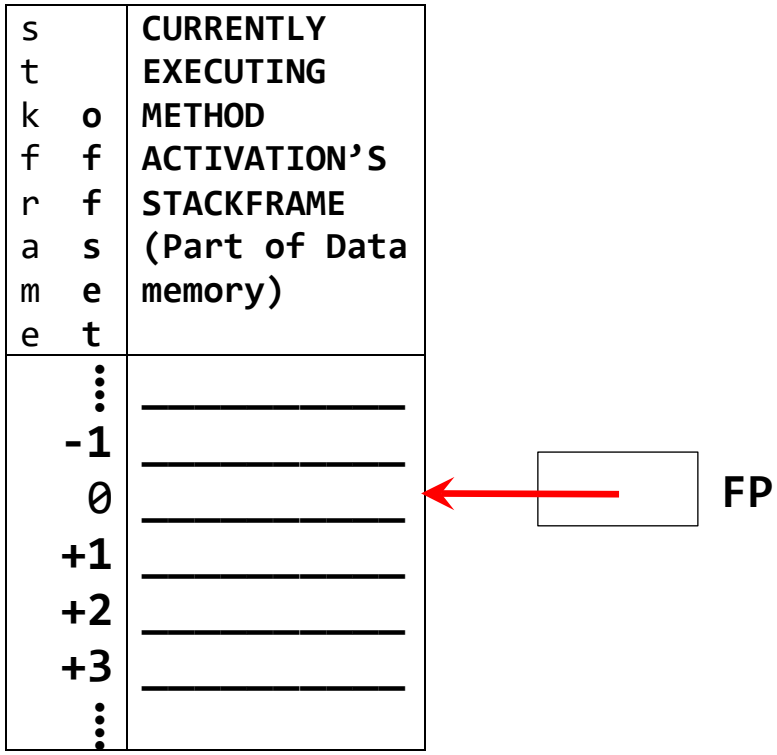


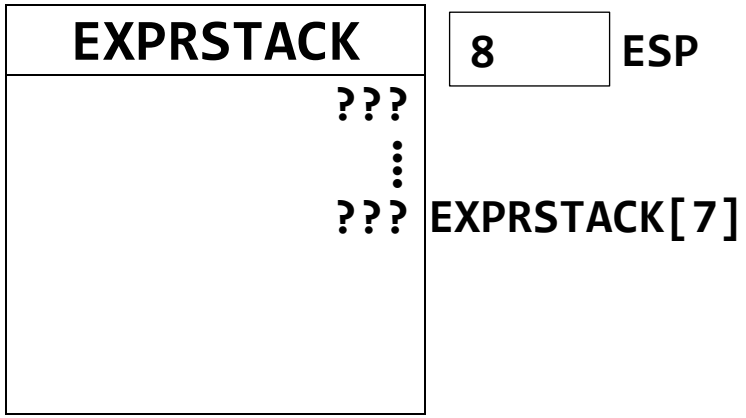


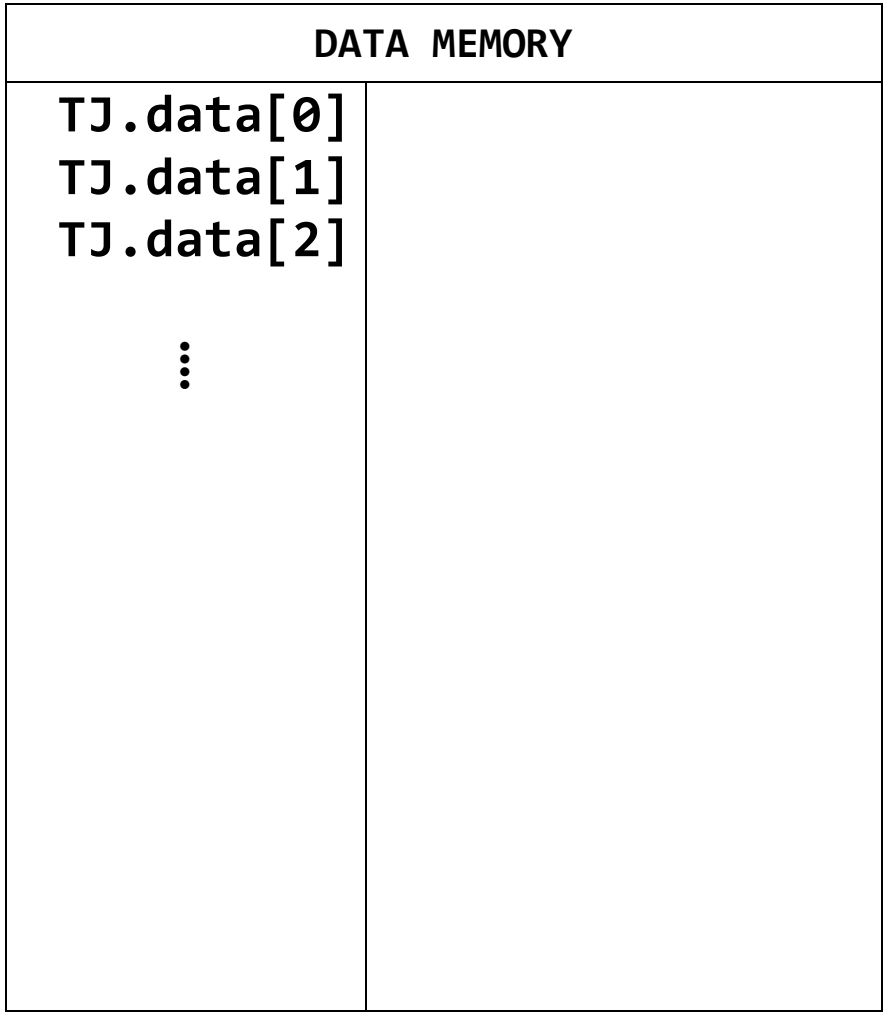
After **execution of**

```
EXPRSTACK[--ESP-1] =
   (EXPRSTACK[ESP-1] <= EXPRSTACK[ESP])
       ? 1 : 0;
```

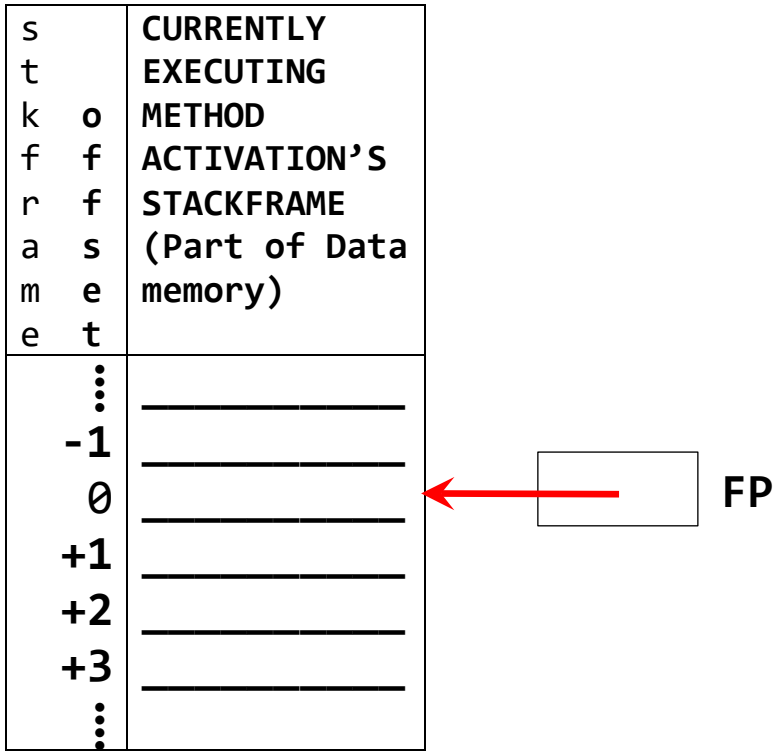
Before *Execution of* PUSHNUM 5:

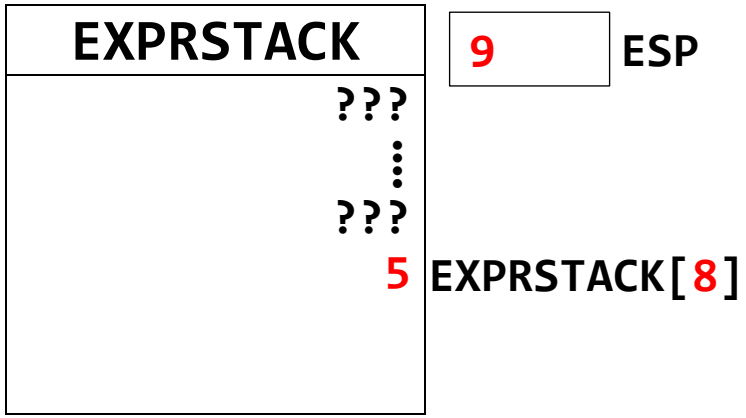


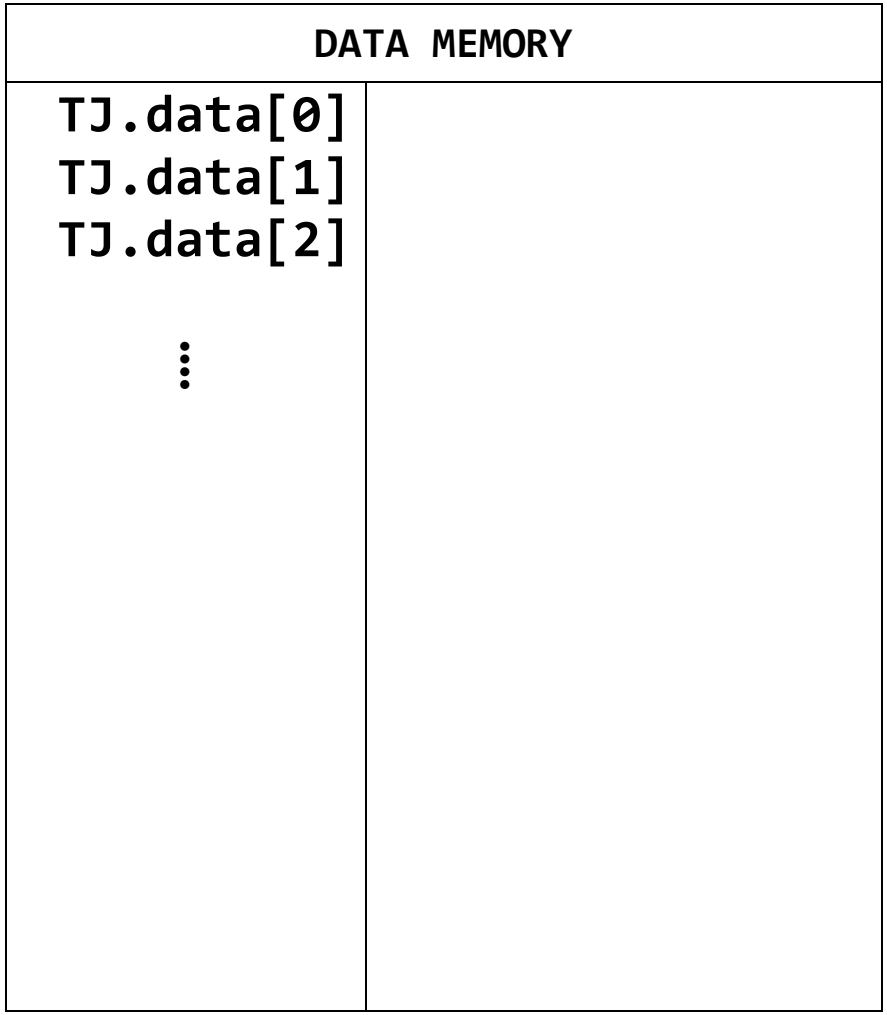




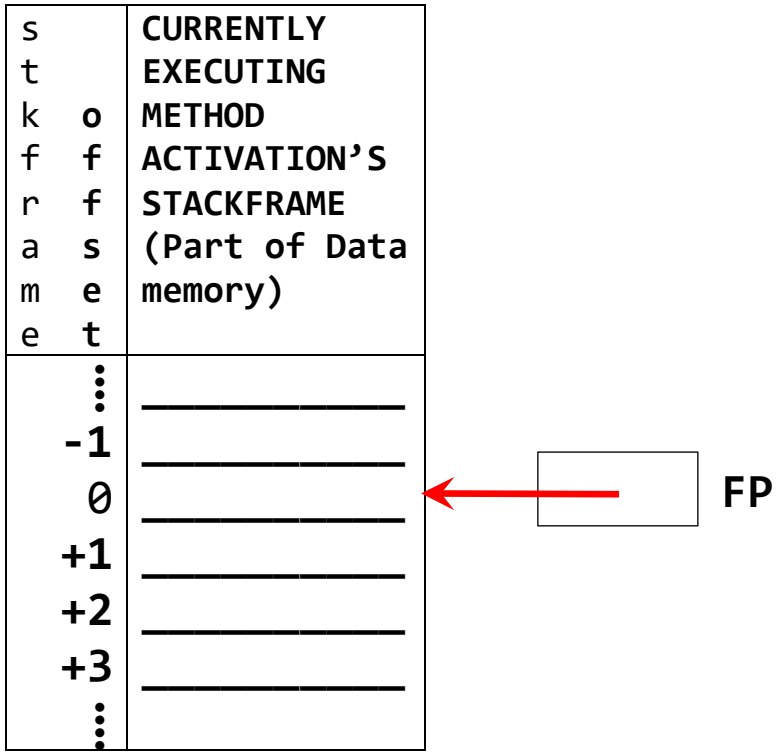
After *Execution of* PUSHNUM 5:

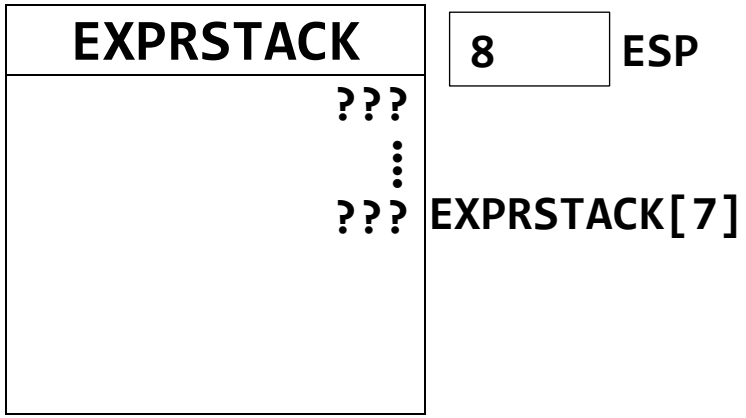


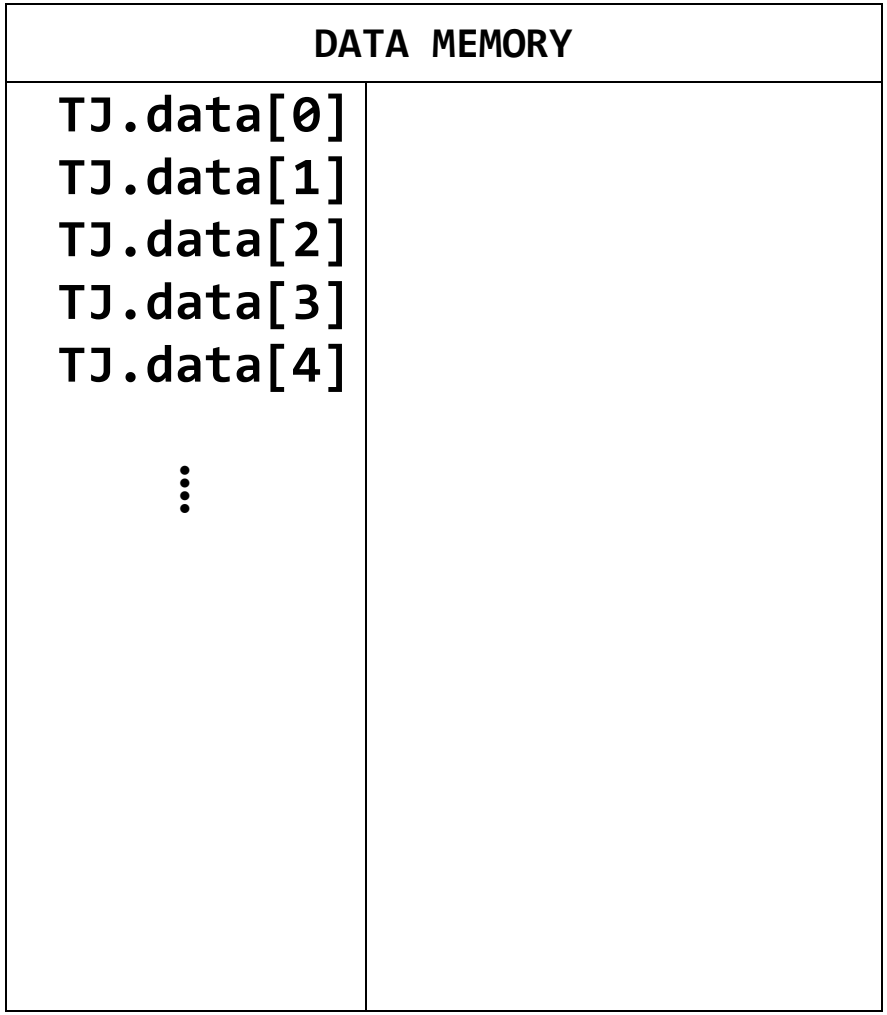




Before *Execution of* PUSHSTATADDR 4:







After *Execution of* PUSHSTATADDR 4:

stk frame offset	CURRENTLY EXECUTING METHOD ACTIVATION'S STACKFRAME (Part of Data memory)
⋮	
-1	
0	
+1	
+2	
+3	
⋮	

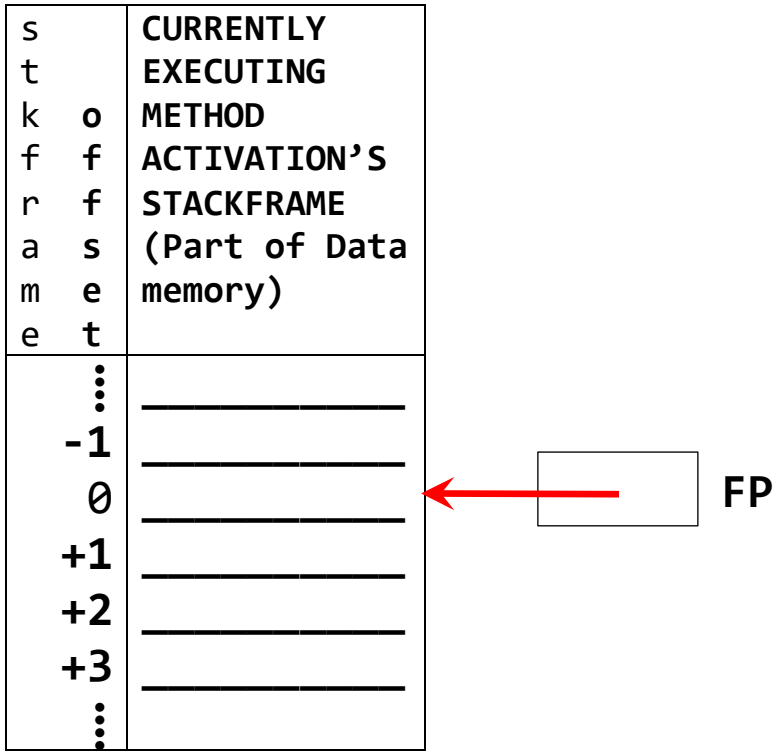
FP

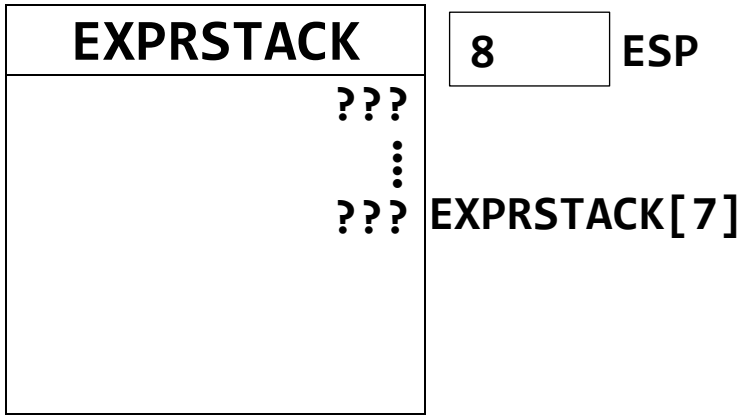
EXPRSTACK	
???	
⋮	
???	
4 + POINTERTAG	EXPRSTACK[8]

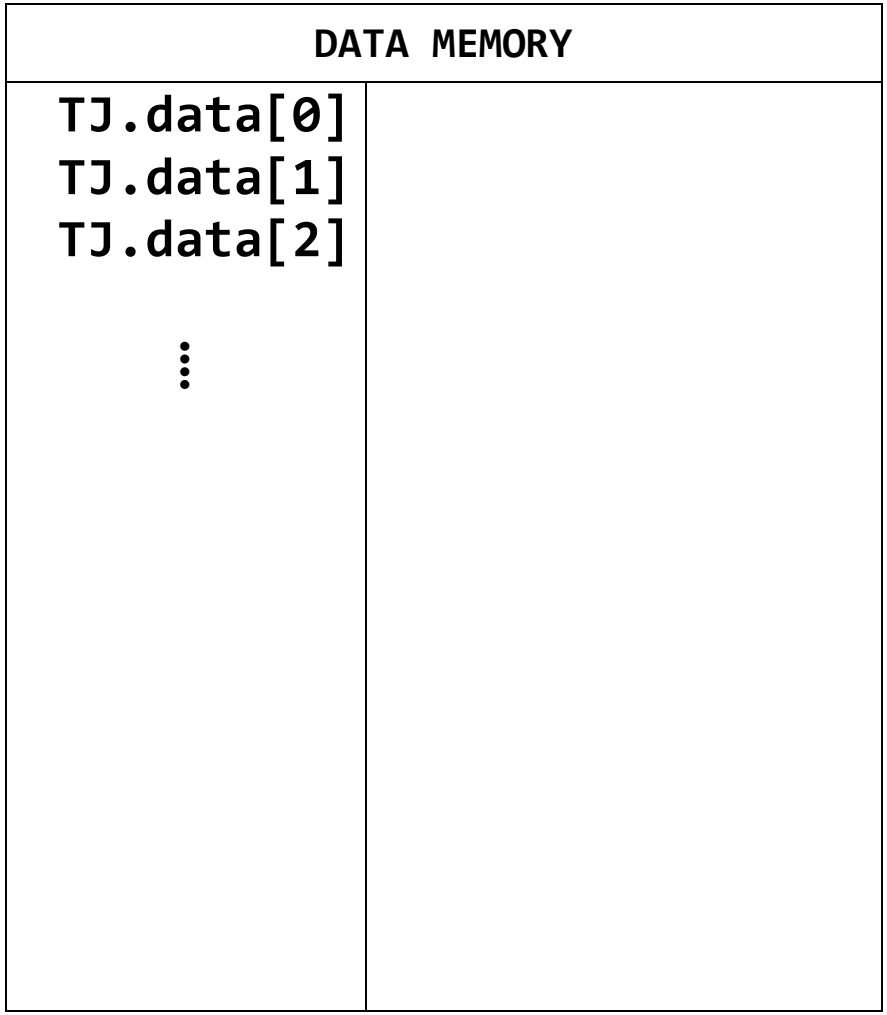
9 ESP

DATA MEMORY	
TJ.data[0]	
TJ.data[1]	
TJ.data[2]	
TJ.data[3]	
TJ.data[4]	
⋮	

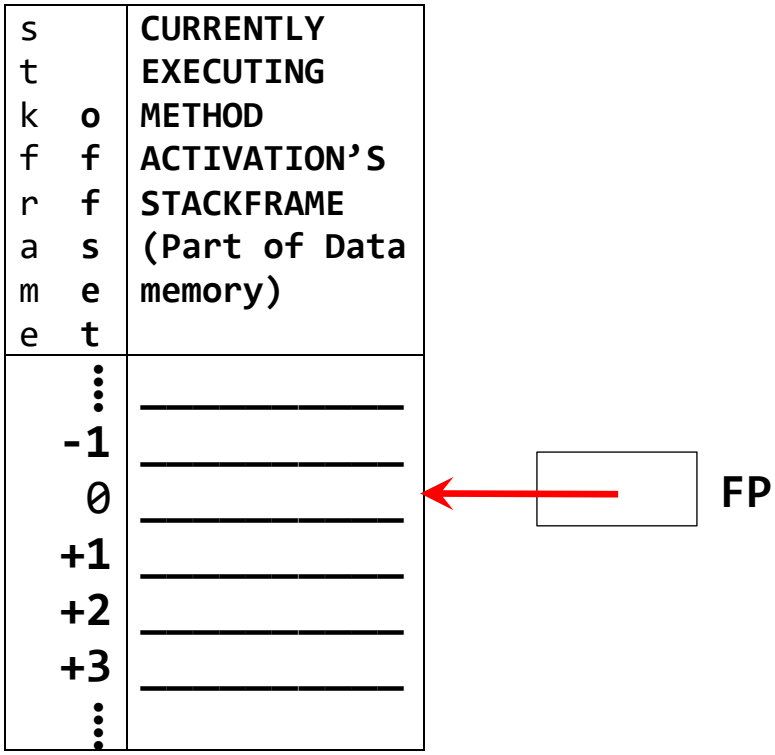
Before *Execution of* PUSHLOCADDR 3:

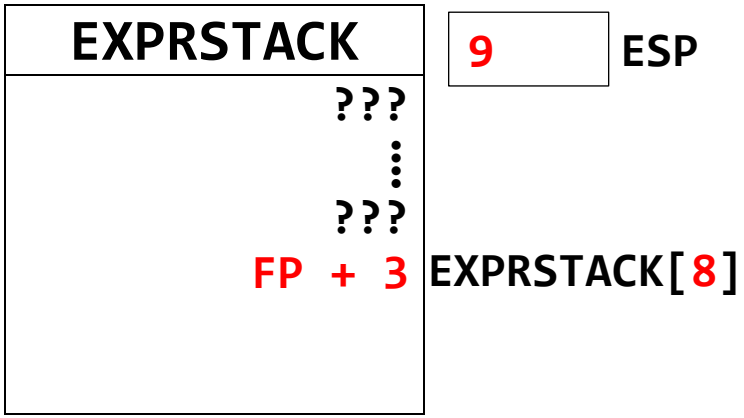


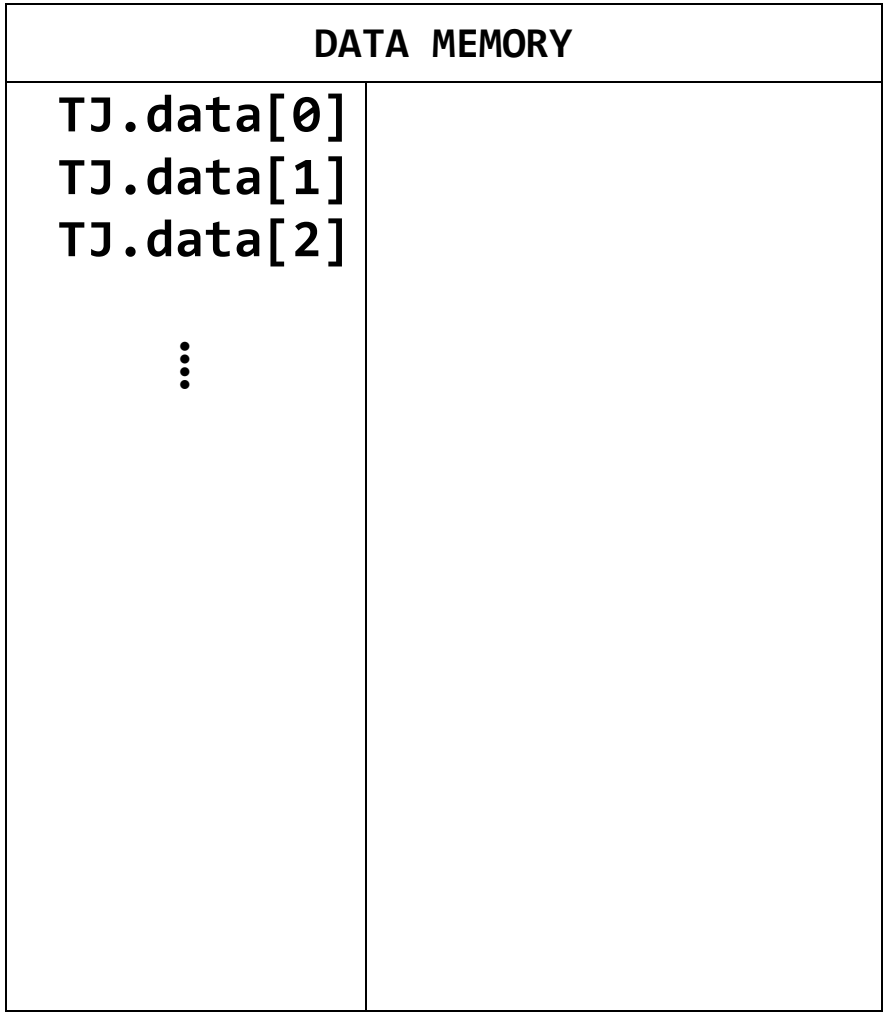




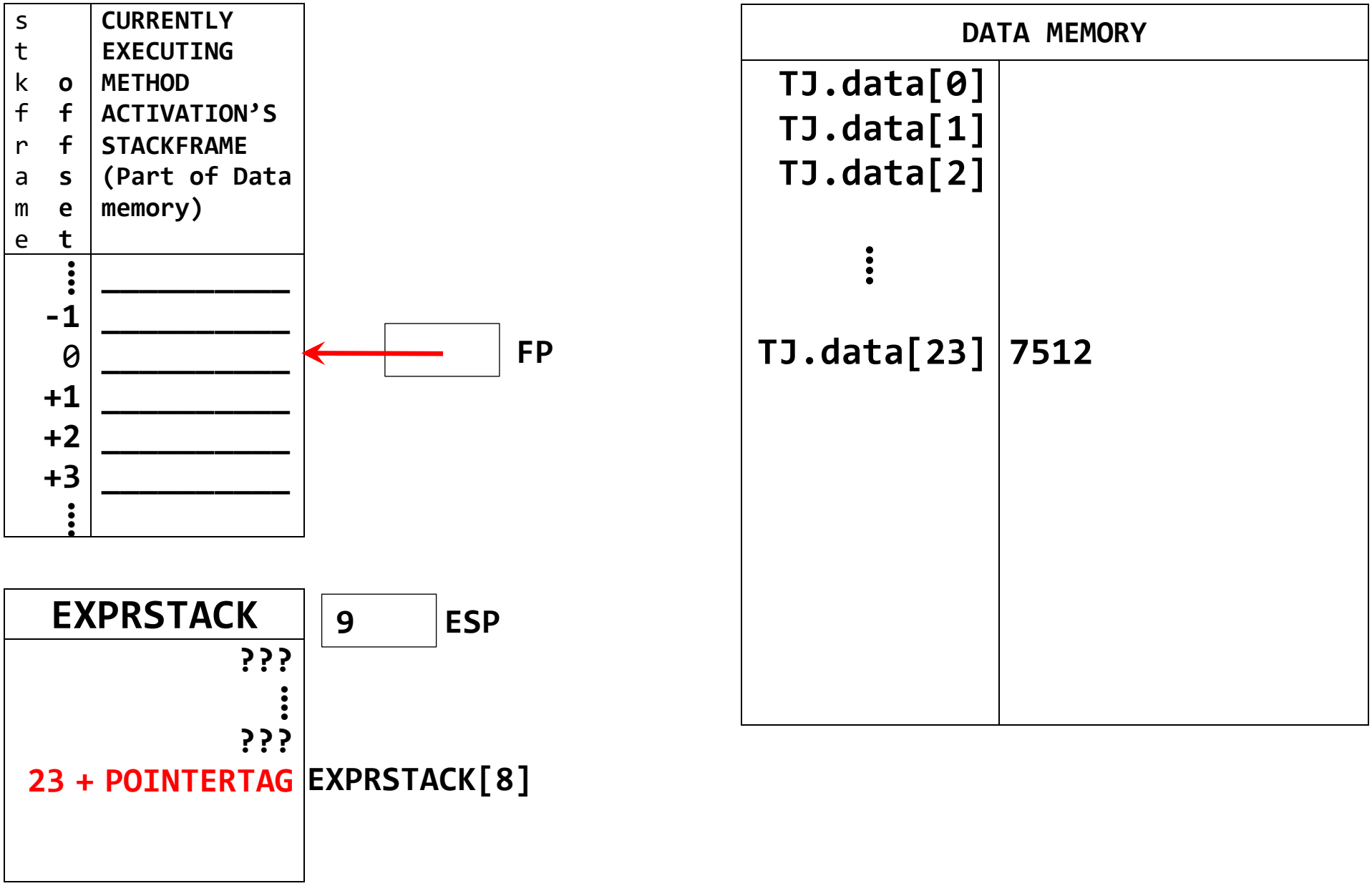
After *Execution of* PUSHLOCADDR 3:



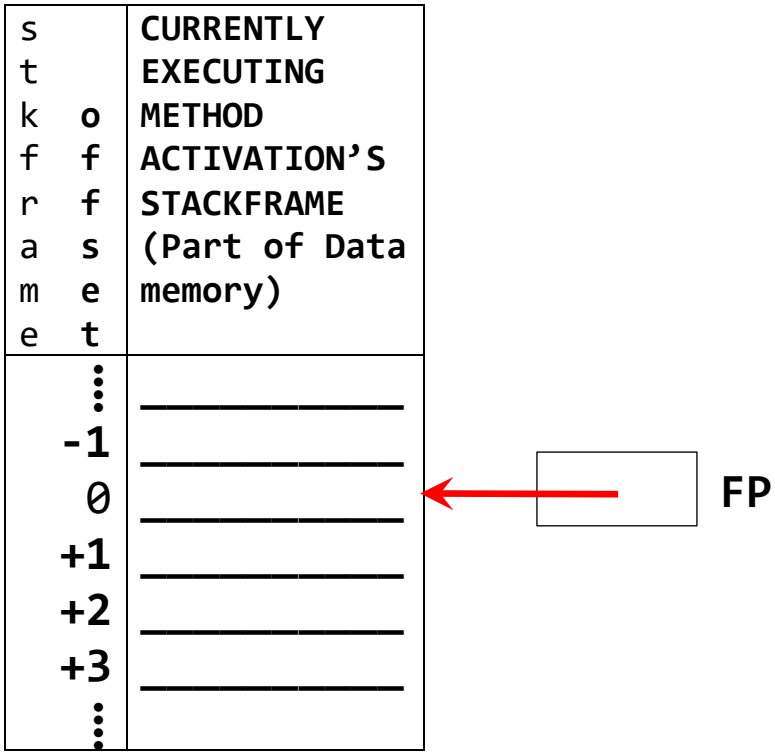


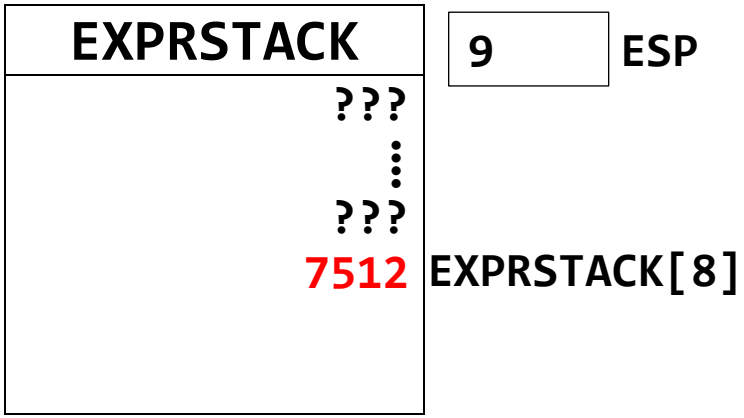


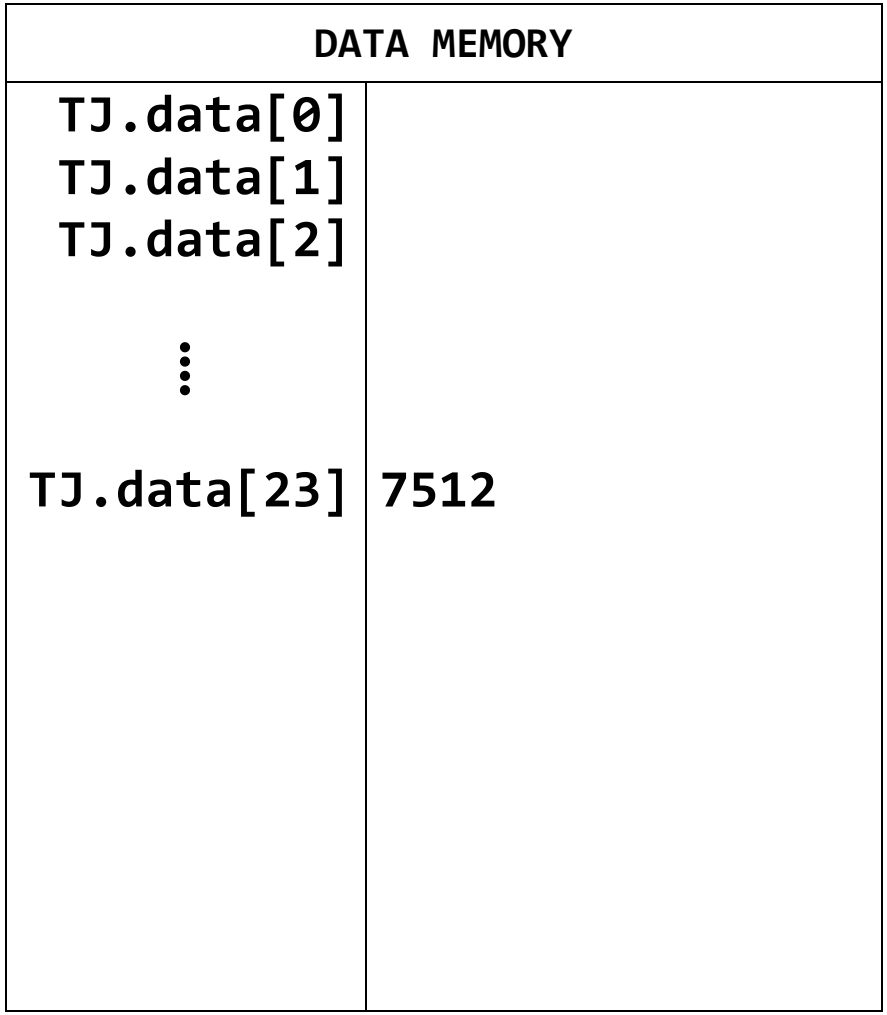
Before *Execution of* LOADFROMADDR:



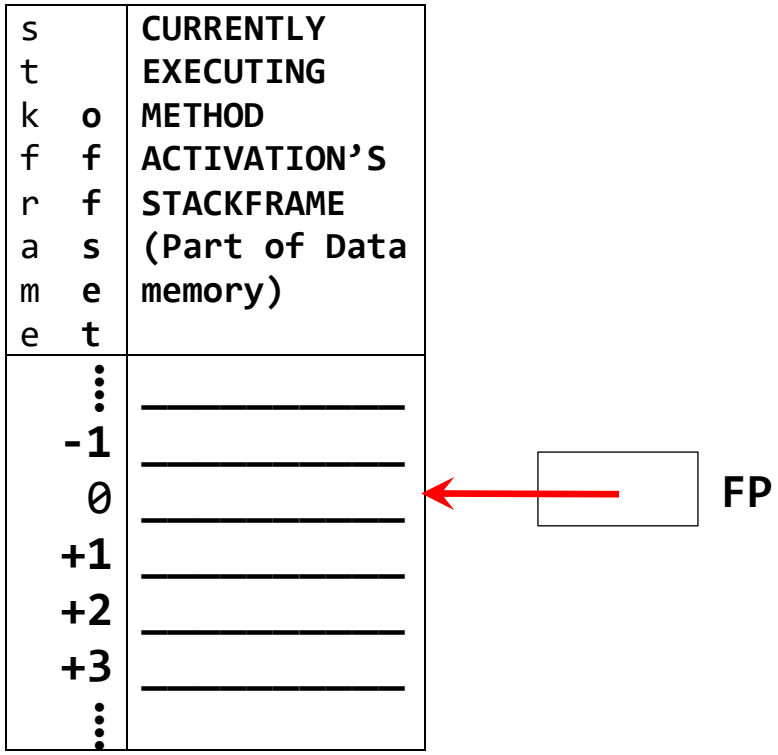
After *Execution of* LOADFROMADDR:

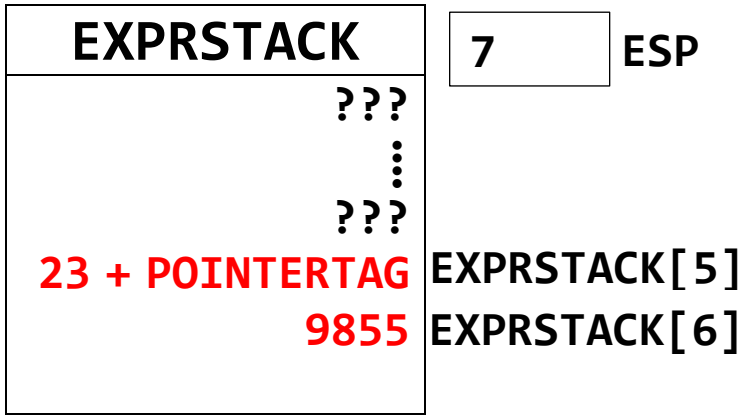


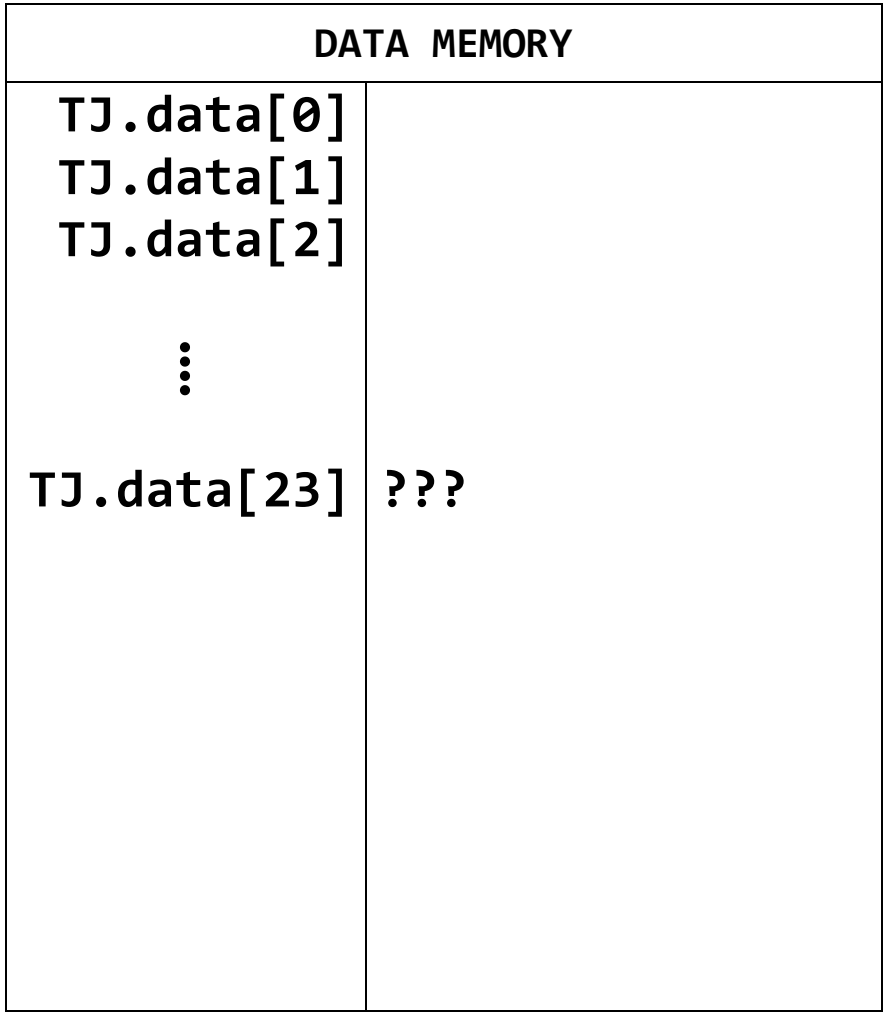




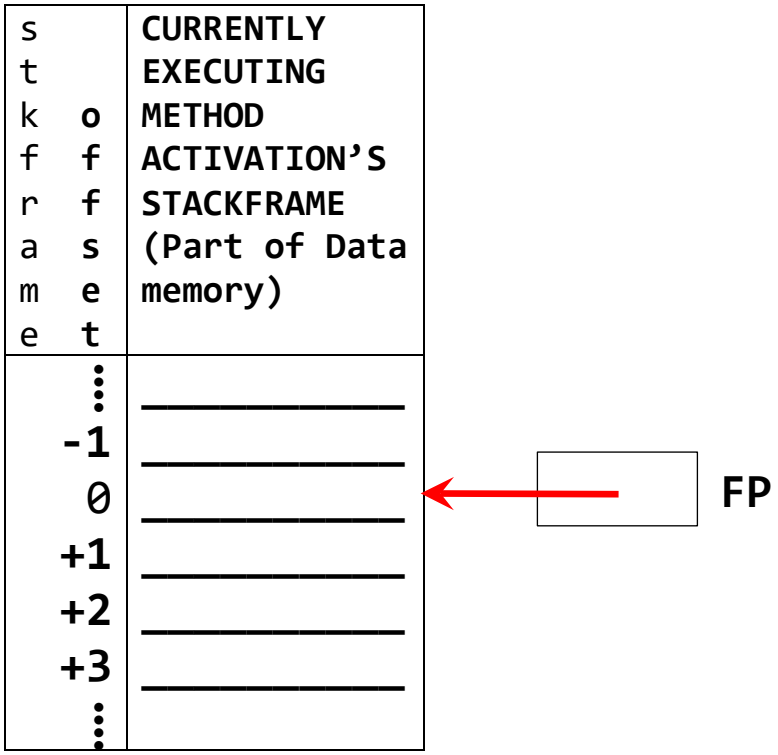
Before *Execution of* SAVETOADDR:

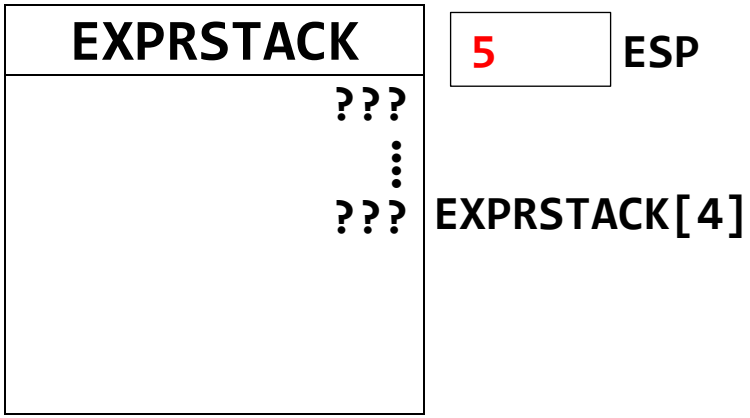


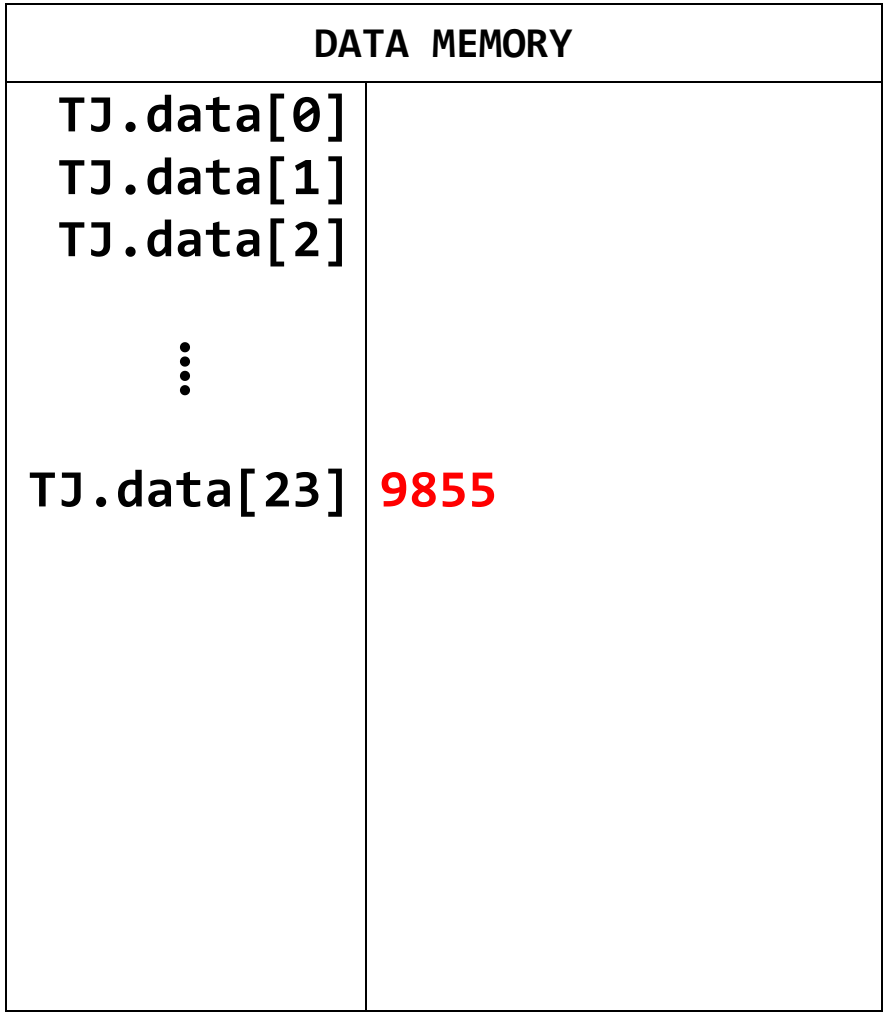




After *Execution of* SAVETOADDR:







BEFORE execution of: WRITESTRING 3 9

stkframe offset	CURRENTLY EXECUTING METHOD ACTIVATION'S STACKFRAME (Part of Data Memory)

EXPRSTACK

address	DATA MEMORY
0	
1	
2	
3	'T'
4	'h'
5	'e'
6	' '
7	'C'
8	'a'
9	't'
10	
11	
⋮	

address	HEAP (Part of Data Memory)

address	CODE MEMORY
	WRITESTRING 3 9

AFTER execution of: WRITESTRING 3 9

stkfrm offset	CURRENTLY EXECUTING METHOD ACTIVATION'S STACKFRAME (Part of Data Memory)

EXPRSTACK

address	DATA MEMORY
0	
1	
2	
3	'T'
4	'h'
5	'e'
6	' '
7	'C'
8	'a'
9	't'
10	
11	
:	

address	HEAP (Part of Data Memory)

address	CODE MEMORY
	WRITESTRING 3 9

In this example, execution of
WRITESTRING 3 9
writes the string
The Cat
to the screen.

BEFORE *execution of*: **JUMP 87**

PC | 34

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

address	CODE MEMORY
0	
1	
⋮	
33	JUMP 87
⋮	
87	

AFTER *execution of*: **JUMP 87**

PC | 87

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

address	CODE MEMORY
0	
1	
⋮	
33	JUMP 87
⋮	
87	

BEFORE execution of: **JUMPONFALSE 77** (Example 1)

PC | 52

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

EXPRSTACK
???
⋮
???
1

address	CODE MEMORY
0	
1	
⋮	
51	JUMPONFALSE 77
⋮	
77	

AFTER *execution of*: **JUMPONFALSE 77** (Example 1)

PC | 52

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

EXPRSTACK
???
⋮
???

address	CODE MEMORY
0	
1	
⋮	
51	JUMPONFALSE 77
⋮	
77	

BEFORE execution of: **JUMPONFALSE 77** (Example 2)

PC | 52

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

EXPRSTACK
???
⋮
???
0

address	CODE MEMORY
0	
1	
⋮	
51	JUMPONFALSE 77
⋮	
77	

AFTER *execution of*: **JUMPONFALSE 77** (Example 2)

PC **77**

NOTE: The PC register is the program counter; it is used to store the code memory address of the next instruction to be executed.

EXPRSTACK

???
⋮
???

address	CODE MEMORY
0	
1	
⋮	
51	**JUMPONFALSE 77**
⋮	
77	