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## CSA PRACTICAL: ASSIGNMENT 2

1. Write an assembly language program for simulating following register reference instructions:

i. SPA

The screenshot shows the MACHINE 3-2 simulator interface. The main window displays the assembly code for the SPA program:

```
INP
SPA
OUT
INP
OUT
HALT
```

The RAM MAIN window shows the memory contents:

A.	Data	Comments
0	-8	INP
1	0	
2	112	SPA
3	16	
4	-12	OUT
5	0	
6	-8	INP
7	0	
8	-12	OUT
9	0	
10	112	HALT
11	1	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	

The Registers window shows the register values:

name	width	value
AC	16	-12
AR	12	10
DR	16	28673
E	1	0
INPR	8	0
IR	16	28673
OUTR	8	0
PC	12	12
S	1	-1

The IO Console window shows the input and output:

```
Enter an integer: -7
Output: -7
Enter an integer: -12
Output: -12
```

ii. SNA

The screenshot shows the MACHINE 3-2 simulator interface. The main window displays the assembly code for the SNA program:

```
INP
SNA
OUT
INP
OUT
HALT
```

The RAM MAIN window shows the memory contents:

A.	Data	Comments
0	-8	INP
1	0	
2	112	SNA
3	8	
4	-12	OUT
5	0	
6	-8	INP
7	0	
8	-12	OUT
9	0	
10	112	HALT
11	1	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	

The Registers window shows the register values:

name	width	value
AC	16	5
AR	12	10
DR	16	28673
E	1	0
INPR	8	0
IR	16	28673
OUTR	8	0
PC	12	12
S	1	-1

The IO Console window shows the input and output:

```
Enter an integer: -5
Output: -5
Enter an integer: 5
Output: 5
```

### iii. SZA

The screenshot shows the MACHINE 3-2 interface. The SZA instruction is highlighted in the instruction list. The RAM MAIN window shows the current state of memory. The Registers window shows the current state of registers. The IO Console shows the input and output values.

Address	Data	Comments
0	-8	INP
1	0	
2	112	SZA
3	4	
4	-12	OUT
5	0	
6	-8	INP
7	0	
8	-12	OUT
9	0	
10	112	HALT
11	1	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	

name	width	value
AC	16	3
AR	12	10
DR	16	28673
E	1	0
INPR	8	0
IR	16	28673
OUTR	8	0
PC	12	12
S	1	-1

IO Console

Enter an integer: 5  
Output: 5  
Enter an integer: 3  
Output: 3

The screenshot shows the MACHINE 3-2 interface. The SZA instruction is highlighted in the instruction list. The RAM MAIN window shows the current state of memory. The Registers window shows the current state of registers. The IO Console shows the input and output values.

Address	Data	Comments
0	-8	INP
1	0	
2	112	SZA
3	4	
4	-12	OUT
5	0	
6	-8	INP
7	0	
8	-12	OUT
9	0	
10	112	HALT
11	1	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	

name	width	value
AC	16	5
AR	12	10
DR	16	28673
E	1	0
INPR	8	0
IR	16	28673
OUTR	8	0
PC	12	12
S	1	-1

IO Console

Enter an integer: 0  
Enter an integer: 5  
Output: 5

### iv. SZE

