Riphah School of Computing and Innovation (RSCI), Lahore

Computer Organization and Assembly Language (Lab)

Lab Report # 1

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CS 3B

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Task 1:

To take input and Subtract.

Code:

```
IN

SUB 99

OUT

HLT

*99

DAT 010
```

Explanation:

- Firstly we Store 10 on address 99
- We take input
- Subtract 10 (i.e Address 99 value)
- Output the value
- Halt the program

Task 2:

To take two input as hardcore and Add them

Code:

```
ADD 80 81

OUT

HLT

*80

DAT 010

DAT 123
```

Explanation:

- Hardcode values at Address 80 and 81
- Add address 80 and 81

- Output value in AC
- Halt the program

Task 3:
Add three numbers and display results.

Code:

```
IN

STO 30

IN

STO 31

IN

STO 32

LDA 30

ADD 31

ADD 32

OUT

HLT
```

Explanation:

- Input value and Store on Address 30
- Input value and store on Address 31
- Input value and store on Address 32
- Load Address 30 in AC
- Add Address 31 to AC
- Add Address 32 to AC
- Output
- Halt the program

Task 4:
Write a VVM programs to Input a number, add 100 to it and output the result. The number 100 should be placed in a memory location prior to running the program.

Code:

```
IN

STO 30

LDA 30

ADD 10

OUT

HLT

*10

DAT 100
```

Explanation:

- Store Data Value (100) at address 10
- Input value and store at Address 30
- Load address 30 in AC
- Add address 10 (100) to AC value
- Output AC
- Halt the Program

Task 5:
Write a VVM programs to input a number, double it, and output the result.

Code:

```
IN

STO 30

ADD 30

OUT

HLT
```

Explanation:

- Input the value and Store on Address 30
- Add value at address 30 again
- Output the value
- Halt the Program

Task 6:
Write a VVM programs to input a number, double it, subtract 1, and output the result

Code:

```
IN

STO 30

ADD 30

SUB 12

OUT

HLT

*12

DAT 001
```

Explanation:

- Store Data Value of 01 at Address 12
- Input value and store Address 30
- Add value at address 30 again
- Subtract value at address 12
- Output the Value
- Halt the program

Task 7:
Write a VVM programs to input three numbers, add the first two together, subtract the third from the sum, and output the result.

Code:

```
IN

STO 31

IN

STO 32

IN

STO 33

LDA 31

ADD 32

SUB 33

OUT

HLT
```

Explanation:

- Input value and store at Address 31
- Input value and store at Address 32
- Input value and store at Address 33
- Load Address 31 in AC
- Add value from Address 32
- Subtract value of Address 33 from AC
- Output the Value
- Halt the program

Task 8:
Take any integer as input, if the number is greater than 5 print it If a>5, print a Else if a=0,then Halt Else if a<5,then halt

Code:

```
IN

// Only input 5

STO 95

IN

STO 98

LDA 98

BRZ 99

LDA 98

SUB 95

BRP 10

BR 12

LDA 98

OUT

HLT
```

Explanation:

- Input 5 and store on address 95
- In a value and store on Address 98
- Load 98 address in AC
- Check if value is Zero (if it is zero halt the program)
- Load 98
- Sub value at 95 (i.e 5) from AC
- Check if result is positive or zero (if it is positive go to Instruction 10)
- Load value from 98 address

- Output the value
- If the condition is false i.e negative go to instruction 12 i.e halt the program

Task 9:
Take two numbers as input and print the larger number.

Code:

```
IN

STO 50

IN

STO 51

LDA 50

SUB 51

BRP 10

LDA 51

OUT

HLT

LDA 50

OUT

HLT
```

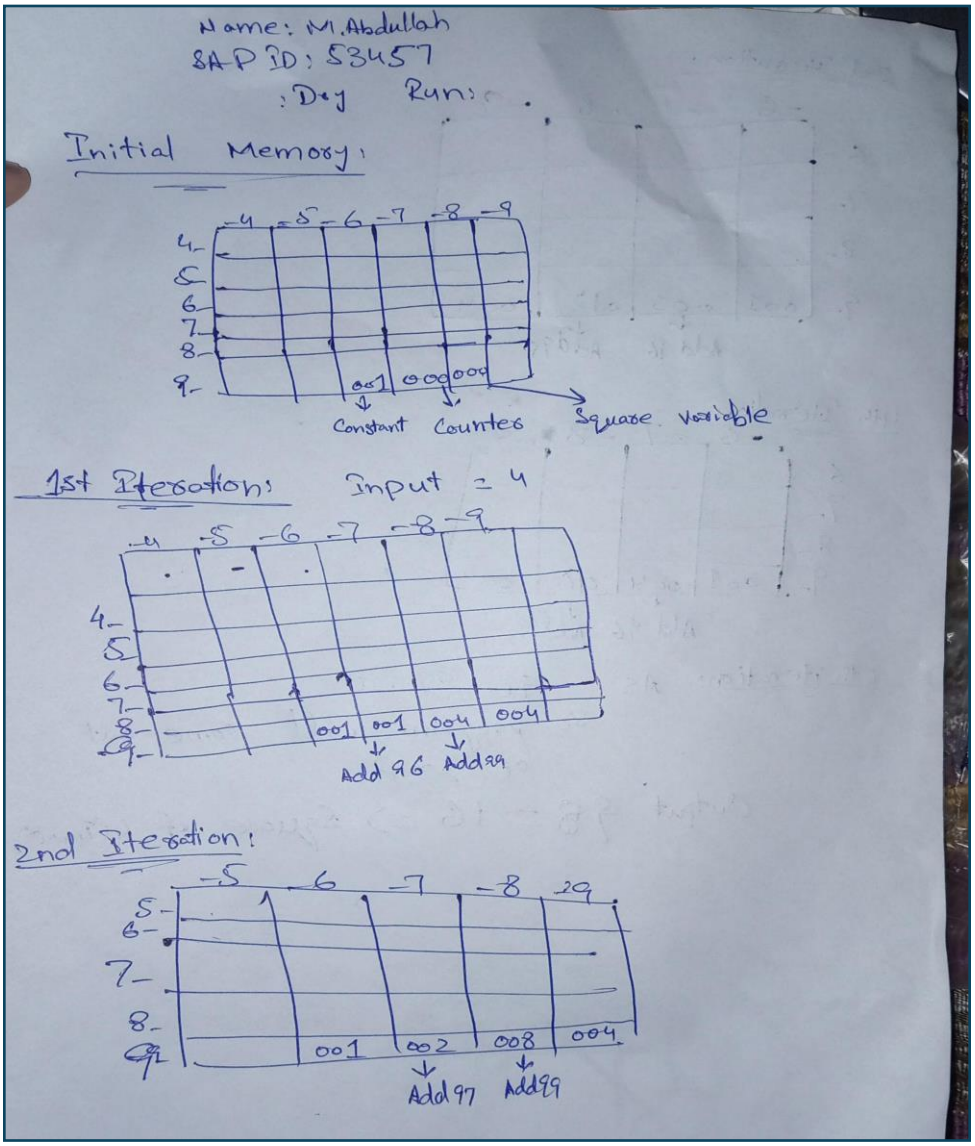
Explanation:

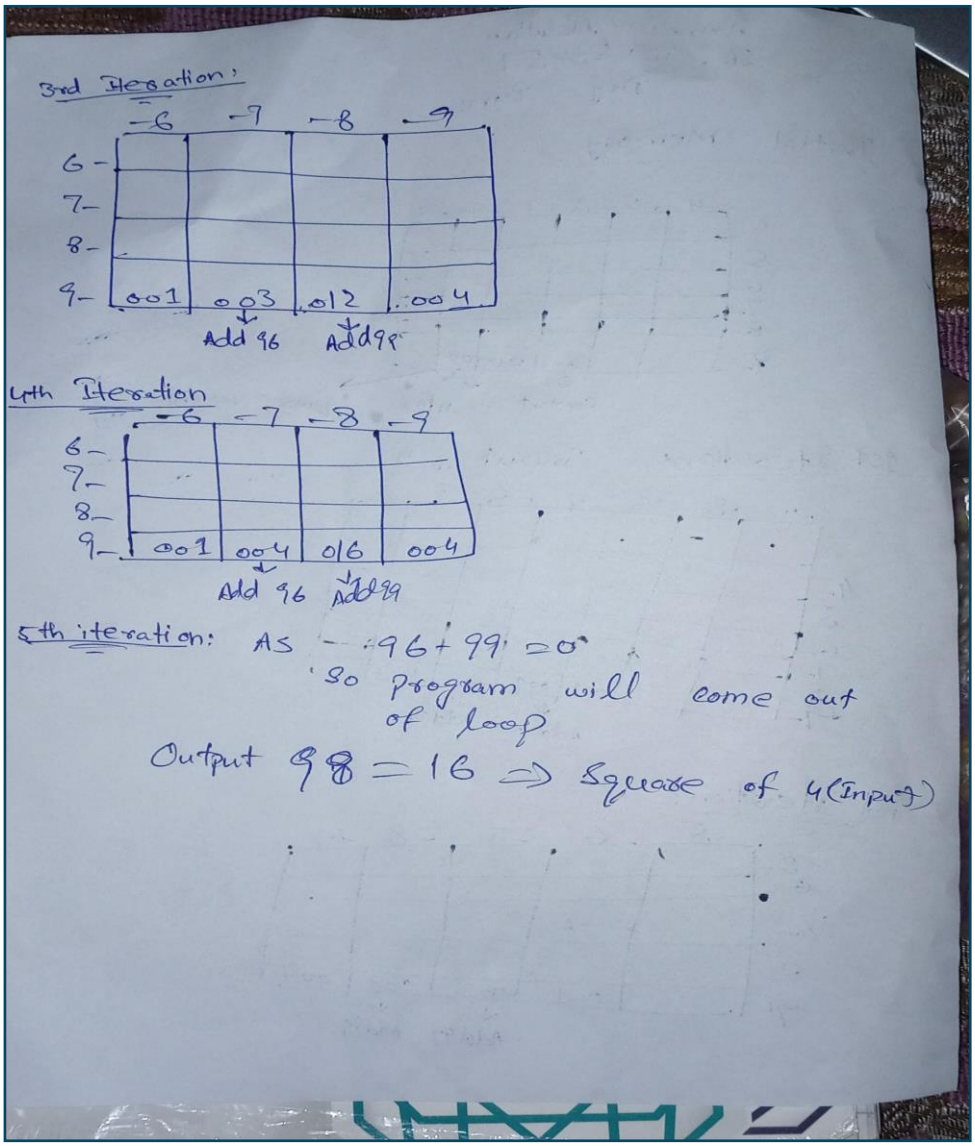
- Input a value and store at address 50
- Input a value and store at address 51
- Load Value of address 50
- Subtract value of Address 51
- If result is positive (in case first number is greater) go to instruction 10
    1. Load value from Address 50
    2. Output the value
    3. Halt the program
- Else (2nd number is greater)

1. Load value from Address 51
2. Output the value
3. Halt the program

Task 10:
Print the square of any integer in the range 1-31.

Note: Add handwritten Iterations here and paste image of it.





Code:

```
IN
STO 99
LDA 98
ADD 99
STO 98
LDA 97
```

```
ADD 96
STO 97
SUB 99
BRZ 13
BR 02
LDA 98
OUT
HLT
*96
DAT 001
DAT 000
DAT 000
```

Explanation:

- Store Data value 001 at 96, 000 at 97 for counter, 000 98 for square value
- Input a value and store at address 99
- Add value at 99 to 98 address
- Add 96 (001 value) to Address 97
- Subtract 99 address from 97
- If result is zero (i.e 97==99(input))
    1. Output 97 (square)
    2. Halt the program
- Go to instruction 02 (i.e 3rd bullet point here)
- Perform each step again

Task 11:
Write a VVM program which takes an integer input and display table of that integer.

Code:

```
IN
```

```
STO 81
LDA 90
SUB 91
BRP 13
LDA 82
ADD 81
OUT
STO 82
LDA 90
ADD 92
STO 90
BR 02
HLT
*90
DAT 000
DAT 010
DAT 001
```

Explanation:

- Store Data value 000 at 90 for counter, 010 at 91 for condition, 001 at 92 as a constant
- Input a value and store at address 81
- Load 90 and subtract 91 (i.e 10)
- If result is positive or zero (i.e 90-91>=0)
  1. Halt the program
- Load Address 82 (0 for first time)
- Add 81 (input value) to AC
- Output the value
- Store AC value to address 82
- Load 90

- ADD 92 (i.e 001)
- Store in 90
- Go to instruction 02 (i.e 3rd bullet point here)
- Perform each step again