Subroutine :→ A Subroutine is a sequence of Program instructions that Perform a specific task, Packaged as a Unit. This unit can then be used in Programs wherever that Particular task have to be Performed. A Subroutine is often Coded so that it can be started (called) several times and from several Places during one execution of the Program, including from other Subroutines, and then branch back (return) to the next instruction after the call, once the Subroutine's task is done. It is implemented by using CALL and RET instructions.

eg:→ Write a Program to find the factorial of a number.

Input -

2000	04H

Output

2001	18H

factorial is done by repeated addition as 4×3 is equivalent to 4+4+4 (i.e 3 times). Load 04H in Register D → Add 04H 3 times → D register now contains 0CH → Add 0CH 2 times → D register now contains 18H → Add 18H 1 times → D register now contains 18H → Output is 18H.

Algorithm :-

1. Load the data into register B
2. To start multiplication set D to 01H.
3. Jump to step 7.
4. Decrements B to multiply Previous number
5. Jump to step 3 till value of B>0.
6. Take memory Pointer to the next location and Store result.
7. load E with Content of B and clear accumulator.
8. Repeatedly add contents of D to accumulator E times.
9. Store accumulator content of D.
10. Go to step 4.

Program :-

Address		mnemonics	operands/data	Comment
2002		LXI	H 2000	Load Data from 2000
		MOV	B, M	load from 2000 to B
		MVI	D 01	Set D register to 01
	factorial	CALL	multiply	Subroutine call for multiplication
		DCR	B	Decrement in B register
		JNZ	factorial	Jump till B becomes Zero
		INX	H	increment memory
		MOV	M, D	Store Result in memory
		HLT		Terminate the Program.
	multiply	MOV	E, B	Transfer Contents of B to E
		MVI	A 00	Clear Accumulator
	loop	ADD	D	Add Content of D to A
		DCR	E	Decrement E
		JNZ	loop	Repeated addition
		MOV	D, A	transfer Content of D to A
		RET		Return from Subroutine

Explanation :-

1. First set register B with data
2. Set register D with data by calling "Multiply" subroutine one time.
3. Decrement B and add D to itself B times by calling "multiply" subroutine as 4*3 is equivalent to 4+4+4 (i.e 3 times)
4. Repeat the above step till B reaches 0 and then exit the Program.
5. The result is obtained in D register which is Stored in memory.