

Date: 03-02-2022 Exp. 4 Permutationa nd Combination



Aim:

To find the permutations and combinations using procedures.

Tool Used:

Assembler - MASM 611

Algorithm:

1. Factorial :
 1. Move the number whose factorial is to be calculated to CX.
 2. Initialise AX and BX.
 3. While BX<CX, increment BX, multiply with AX.
 4. Return the factorial of the number
2. Calculate (n-r).
 3. Calculate n factorial , Calculate r factorial , Calculate n-r factorial
 4. For permutations, divide n factorial by n-r factorial
 5. For combinations, divide permutations by r factorial

Program:

```
;*****  
; ALP TO FIND nCr  
; Max. n=8 (as 9! > 16-bit)  
;*****
```

```
assume cs:code,ds:data
```

```
data segment
```

```
org 1000h
```

```
n equ 05h
```

```
r equ 04h
```

```
tepp dw ? ; for r!
```

```
temp dw ? ; stores (n-r)!
```

```
npr dw ?
```

```
ncr dw ?
```

```
data ends
```

```
code segment
```

```
start:
```

```
mov ax,data
```

```
mov ds,ax
```

```
xor ax,ax
```

```
xor dx,dx; cleared to be used for 16-bit division
```

```
mov bx,n-r
cmp bx,01h
jnz lp1
mov temp,01h
jmp lp3
lp1: call fact
mov temp,ax
xor ax,ax
lp3:
mov bx,r
cmp bx,01h
jnz lp4
mov tepp,01h
jmp lp2
lp4:
call fact
mov tepp,ax
xor ax,ax
lp2: mov bx,n
call fact
mov bx,temp
div bx ; (dx|ax)/bx, quo-ax
mov npr,ax
```

```
xor ax,ax  
mov ax,npr  
mov bx,tepp  
div bx  
mov ncr,ax  
hlt
```

```
fact proc  
    mov cx,00h  
    mov cx,bx  
    dec cx  
    mov ax, bx  
proc_lp: dec bx  
    mul bx  
    loop proc_lp
```

```
ret  
fact endp  
code ends
```

```
end start
```

Sample Input:**N=5****R=4****N-R=1****Sample Output:****nPr=120 (Hexa Decimal 78)****nCr = 5****Manual Verification:****Permutation and Combination Calculator**

Total Amount in a Set (n)	<input type="text" value="5"/>
Amount in each Sub-Set (r)	<input type="text" value="4"/>
Calculate  Clear	

Result**Permutations, $nP_r = \frac{5!}{(5 - 4)!} = 120$** **Combinations, $nC_r = \frac{5!}{4! \times (5 - 4)!} = 5$**

Decimal to Hexadecimal converter

From To

Decimal Hexadecimal

Enter decimal number

120 10

= Convert × Reset Swap

Hex number

78 16

Register/ Memory Contents for I/O:

-u		
0865:0043	F7F3	DIU BX
0865:0045	A30410	MOV [1004],AX
0865:0048	33C0	XOR AX,AX
0865:004A	A10410	MOV AX,[1004]
0865:004D	8B1E0010	MOV BX,[1000]
0865:0051	F7F3	DIV BX
0865:0053	A30610	MOV [1006],AX
0865:0056	F4	HLT
0865:0057	B90000	MOV CX,0000
0865:005A	8BCB	MOV CX,BX
0865:005C	49	DEC CX
0865:005D	8BC3	MOV AX,BX
0865:005F	4B	DEC BX
0865:0060	F7E3	MUL BX
0865:0062	E2FB	LOOP 005F
		005F

Snapshot of the Output:

```
-g 0056

AX=0005 BX=0018 CX=0000 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0764 ES=0754 SS=0763 CS=0865 IP=0056 NV UP EI PL ZR NA PE NC
0865:0056 F4          HLT
-d 0764:1000 1006
0764:1000 18 00 01 00 78 00 05
... .x..
```

Result:

The permutation of two number 5 & 4 is calculated to be 78(In hexadecimal).The Combination of two number 5 & 4 is calculated to be 05(In hexadecimal).

Hence, the result of all the operations were obtained and verified manually.