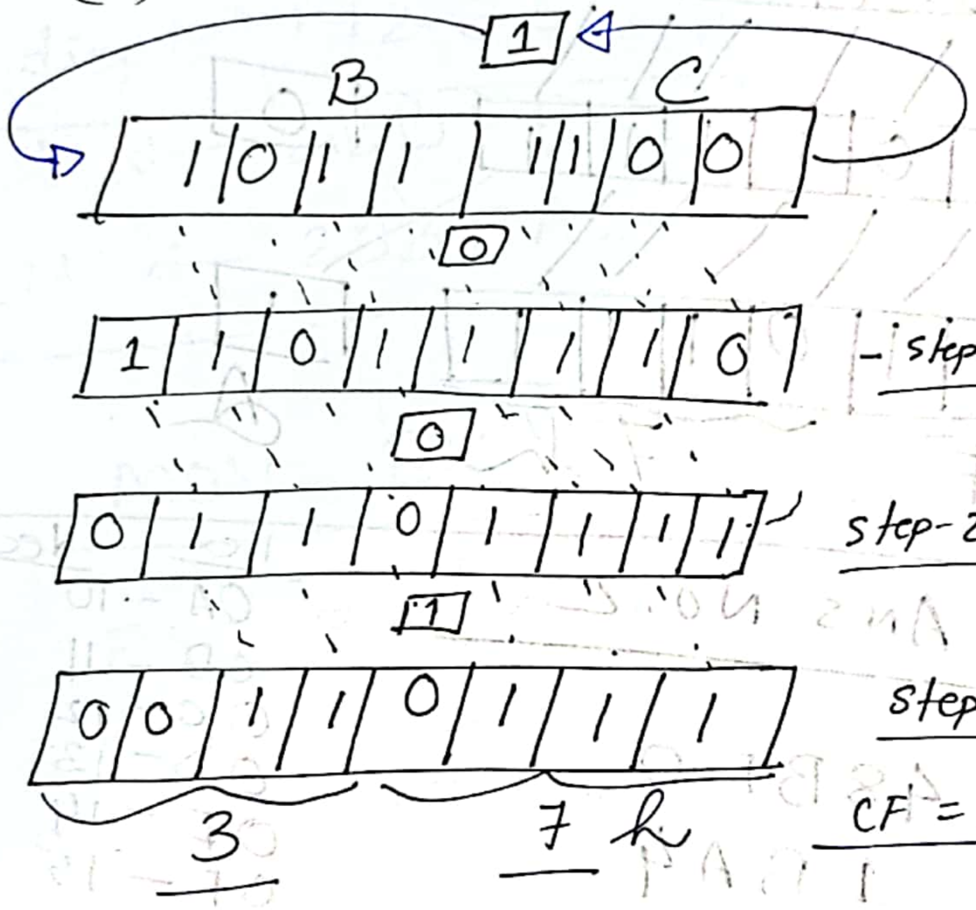
① (a) RCR DL, CL


1
B
C
1 0 1 1 1 1 0 0
0
1 1 0 1 1 1 1 0
0
0 1 1 0 1 1 1 1
1
0 0 1 1 0 1 1 1
3
7 h

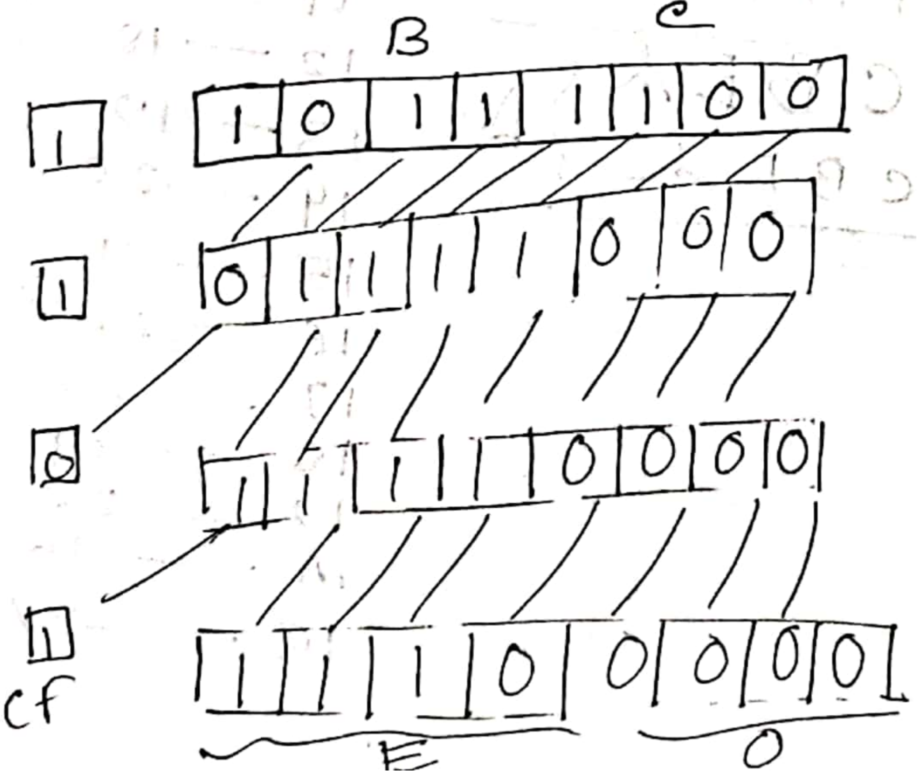
step-1

step-2

step-3

CF = 1 Ans.

(b) SAL DL, CL


B
C
1
1 0 1 1 1 1 0 0
1
0 1 1 1 1 0 0 0
0
1 1 1 1 0 0 0 0
1
cf
1 1 1 1 0 0 0 0 0
E
0

E0h

☐ Flag Register

→ flag register contains the status of the current result.

→ Control flags

→ Conditional flags → Trap flag (TF)
  → Interrupt flag (IF)
  → Directional flag (DF)

→ Control flags

◇1 Sign flag (SF) ◇2 Overflow flag (OF)

③ Carry flag (CF) ◇4 Zero flag (ZF)

◇5 Parity flag (PF) ◇6 Auxiliary flag (AF)

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nibble = 4 bit
byte = 8 bit

SF gives you the
MSB = 1 SF = 1 not negati
MSB = 0 SF = 0

unsigned number
0000 0000
FFFF

OF = indicates there is an overflow in a signed number (gone out of range)

Scanned with CamScanner

Suppose, your ~~#~~ roll numbe or cricket score is always zero.

☐ **unsigned number**

|— — — — — — — —|

8 bit magnitude

0 — 255 dec $2^8 = 256$ combinatio

00h — FFh. hex

there is no bit for sign.

So, if MSB = SF does not apply for ~~si~~ unsigned number.

☐ ~~Signed number~~

0
0000
1111
F

0
0000
1111
F

☐ signed numbers

→ can be either positive/negative.

→ we cannot put '–' infront of numbers like we do in our paper. MP wont understand

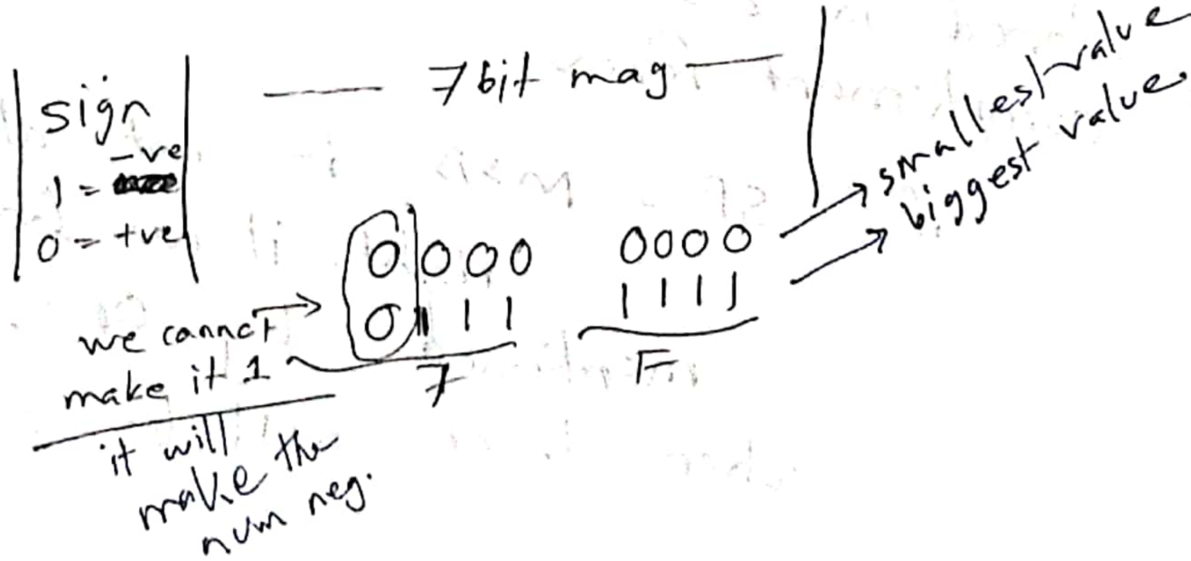
→ we use MSB as signbit

→ $2^8 = 256$ combination will be
half. half (+ve)
half (–ve)

-128 ---- -1 | 0 ---- +127

-80 ---- -01 | 00 ---- 7Fh

$2^7 = 128$ combinations


sign
1 = -ve
0 = +ve
7 bit mag
0 000 0000
0 111 1111
7
F
smallest value
biggest value
we cannot make it 1
it will make the num neg.

☑ negative side

$-80 \curvearrowleft -7F \curvearrowleft -7E \text{ ——— } -01$

if, i got a result

$\underbrace{1\,0\,0\,0}_{8}\quad\underbrace{0\,0\,1\,1}_{3}$ h unsigned system

can have two meanings

since they are all magnitudes.

for signed numbers, the number is always stored in 2's complement form:

$$\begin{array}{cc} 1\,0\,0\,0 & 0\,0\,1\,1 \\ \hline \underbrace{0\,1\,1\,1}_{} & \underbrace{1\,1\,0\,1}_{} \\ \boxed{-7} & \boxed{D} \end{array}$$

if we convert it to

if; SF = MSB is not always right, it can be mentioned by OF; (i-e when there will be overflow)

The continuation of SF comes into overflow flag, when you get ~~of~~ out of range for signed numbers.

i.e. −80 ——— −01, 00 ——— 7Fh

less than −80

more than 7F

if you want to be sure check your ~~overf~~ overflow flag first, at that time only you will know whether your SF is right/wrong.

if, OF = 0, SF = 1/0 is actual sign & it is correct

if, OF = 1, SF = 1/0 is wrong, or showing the wrong sign.

$$\begin{array}{r} 42h \\ +\ 23h \\ \hline 65h \end{array} \qquad \begin{array}{r} 0100\ 0010 \\ +\ 0010\ 0011 \\ \hline 0110\ 0101 \end{array}$$

OF	SF	ZF	PF	AF	CF
0	0	0	1	0	0

even

didnot cross the range +7Fh

16_{10} — 10h

$$\begin{array}{r} 37h \\ +\ 29h \\ \hline 60h \end{array} \qquad \begin{array}{r|l} 0011 & 0111 \\ +\ 0010 & 1001 \\ \hline 0110 & 0000 \end{array}$$

OF	SF	ZF	AF	PF	CF
0	0	0	1	1	0

$$\begin{array}{r} 42h \\ +43h \\ \hline 85 \end{array}$$

out of range

7F

OF	SF	ZF	AF	PF	CF
1	1	0	0	0	0

does not care during unsigned system.

~~DF~~ ☐, TF = 1 ; single step.

~~TF~~ → changed by the programmer for controlling the process of single stepping

~~IF~~

☐ IF = 1 ; in embedded system
enable — Atomic state

IF = 0 — hard time embedded system.
disable

→ air bag should be deployed or not ;

☐ DF = 1 ; string instruction copied — copy / paste.
DF = 0

└ auto decremented

└ " ~~de~~incremented

$\boxed{\text{c}} \rightarrow \boxed{\text{D}}$

+ ABh
− CDh — wrong question — since both the ~~101~~ numbers are out of range.

− 12h → $\boxed{1}$001 0010
− 40h → $\boxed{1}$100 0000

① 101 0010
− 5 2h

both signs are similar

SF = 1,
OF = 0, since it is within range
AF = 0
PF = 0
ZF = 0
CF = 0

− 7D h
+ 23h

$\boxed{1 > 0}$

$\boxed{1}$ 0111 | 1101
$\boxed{0}$ ~~0010~~ | ~~0011~~ $\boxed{1}$
101 | 110

$\cancel{1}$ 101 | 1010
− 5   Ah

CF = 1 ; when there is a carry out of MSB.

```
  1 1 1 1
+ 0 0 0 1
---------
① 0 0 0 0
```

CF=1

☐ **PF** = depending how many 1's are there inside the result.
For odd number of 1's , PF=0
for even ,, ,, ,, , PF=1.

☐ **AF = Auxiliary carry Flag**
when there is a carry from the lower half nibble to upper half nibble.

☐ **ZF** = tells you; whether your result zero or not. Result = 0000 ZF=1
= 0010 ZF=0.