★ Logical operators : (AND, OR, NOT)

① AND – Both should satisfy / True (TT)

A: Sarah has a driver's license → T / F

B: Sarah has a good vision → T / F

A	B	A and B
T	T	T
T	F	F
F	T	F
F	F	F

A and B and C and D and E .... = T only when,

A = B = C = D = E = ... = T (all true)

② OR – atleast one should satisfy (TT, TF, FT)

A	B	A or B
T	T	T
T	F	T
F	T	T
F	F	F

A or B or C or D or E .... = F only when

A = B = C = D = E = ... = F

(all false)

(!)
③ NOT – True → False, False → True

A	B	NOT A	NOT B
T	T	F	F
T	F	F	T
F	T	T	F
F	F	T	T

```
// 1) NOT(!) A
console.log(!A);
// 2) A and(&&) B
console.log(A && B);
// 3) A or(||) B
console.log(A || B);
// 4) (NOT A) and B
console.log(!A && B);
// 5) A OR (NOT B)
console.log(A || !B);
```

Question :

```
Const age = 16;
Const A = (age >= 20);   (16 >= 20) (False)
Const B = (age < 30);    (16 < 30) (True)
```

① !A = !false = true

② A and B = False and true = False

③ A or B = False or True = True

④ (!A) and B = (!false) and true
= true and true = True

⑤ A or (!B) = false or (!true)
= false or false = false

★ Quadrants JS !

The mystery room is divided into four chambers and each chamber will have two boxes storing balls.

Now if both the boxes have blue balls, it must belong to chamber 1.

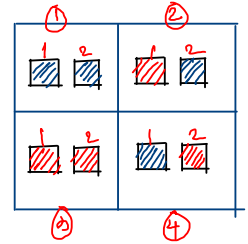
Similarly if the first box has red balls and second box has blue balls, they must belong to chamber 2.

If both the boxes have red balls, they must belong to chamber 3.

Finally if the first box has blue balls and second box has red balls, it must belong to chamber 4.

You are given number of balls in each box and if the number has a negative sign it means the balls are red else the balls are blue if the sign is positive.

Determine the chamber the two boxes belong to given the number and type of balls in each box.




```
if (b1 > 0 && b2 > 0 ) {
    cl ("1");
}
```

Eg: $b_1 = 10$ (Blue) $b_2 = 6$ (Blue)

op: chamber 1

Eg: $b_1 = 9$ (blue) $b_2 = -13$ (red)

op; chamber 4

Eg: $b_1 = -13$ (red) $b_2 = 9$ (blue)

op: chamber 2

$b_1 > 0$, $b_2 > 0$ → chamber 1

$b_1 < 0$, $b_2 > 0$ → chamber 2

$b_1 < 0$, $b_2 < 0$ → chamber 3

$b_1 > 0$, $b_2 < 0$ → chamber 4

★ Leap year :

what ? (366 days) (Feb 29th)

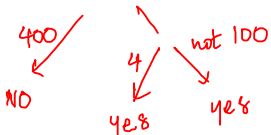
1. divisible by 400 → A

(or)

2. divisible by 4 and not divisible by 100 → B

C D

Eg: 2024



⇒ leap year

Eg: 2100

⇒ not a leap year

Eg: 2050

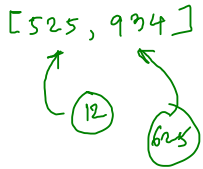
⇒ not a leap year

```
Const A = (year % 400 == 0)
Const C = (year % 4 == 0)
Const D = (year % 100 != 0)

A or B
A or (C and D)

Console.log(A || (C && D));
```

Given a num check whether it is in the given range or not ?

tg: num = 12
L = 525
R = 934

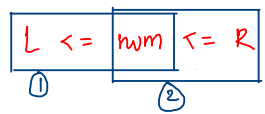
op: false



★ Mathematically, (num is B/w L and R inclusive)

tg: num = 625
L = 525
R = 934

op: true



~~if (L<=num<=R)~~

L<=num, num<=R

and

```
if (L<=num && num<=R) {
    cl(true);
}
else {
    cl(false);
}
```

ASCII values :

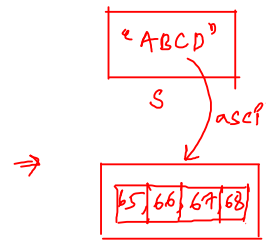
Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040		Space	64	40	100	@	@	96	60	140	`	`
1	1	001	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2	002	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3	003	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4	004	EOT (end of transmission)	36	24	044	$	$	68	44	104	D	D	100	64	144	d	d
5	5	005	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6	006	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7	007	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8	010	BS (backspace)	40	28	050	(	(	72	48	110	H	H	104	68	150	h	h
9	9	011	TAB (horizontal tab)	41	29	051	)	)	73	49	111	I	I	105	69	151	i	i
10	A	012	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B	013	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C	014	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D	015	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E	016	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F	017	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10	020	DLE (data link escape)	48	30	060	0	0	80	50	120	P	P	112	70	160	p	p
17	11	021	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12	022	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13	023	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14	024	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15	025	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16	026	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17	027	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18	030	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19	031	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A	032	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B	033	ESC (escape)	59	3B	073	;	;	91	5B	133	[	[	123	7B	173	{	{
28	1C	034	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174			|
29	1D	035	GS (group separator)	61	3D	075	=	=	93	5D	135	]	]	125	7D	175	}	}
30	1E	036	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F	037	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177	&#127;	DEL

Source: www.LookupTables.com

'0' - '9' (0 - 127)

[48, 57]

```
const s = "ABCD";
```



'A' - 'Z' [65, 90]

'a' - 'z' [97, 122]

① ASCII → character

String.fromCharCode(ascii value);

② "A".charCodeAt(0) → 65

* Which case :

eg : 'A'

op : 1 (capital)

eg : 'a'

op : 0 (small)

eg : '#'

op : -1 (not alphabet)

* if the ascii value of given character is in range

a. [65, 90] → capital → 1

b. [97, 122] → small → 0

c. -1

★ Big Light :

$$t = \left(\frac{h_2 - h_1}{v_1 - v_2}\right) = \frac{7-5}{3-2} = 2$$

① h_1 G: 5m h_2 S: 7m

v_1: 3m/s v_2: 2m/s

time, t = 0s — 5m, 7m

+3 +2

t = 1s — 8m, 9m

+3 +2

t = 2s — 11m, 11m

+3 +2

t = 3s — 14m, 13m

op: will they meet at any time

True

$$T = \left(\frac{h_2 - h_1}{v_1 - v_2}\right) = \frac{7-5}{4-3} = -2$$

what a possible scenario

② G: 5m S: 7m

v_1: 2m/s v_2: 3m/s

time, t = 0s	5m	7m	(7m − 5m = 2m)
t = 1s	7m (+2)	10m (+3)	(10 − 7 = 3)
t = 2s	9m (+2)	13m (+3)	(13 − 9 = 4)
t = 3s	11m (+2)	16m (+3)	(16 − 11 = 5)
t = 4s	13m (+2)	19m (+3)	(19 − 13 = 6)

op: False

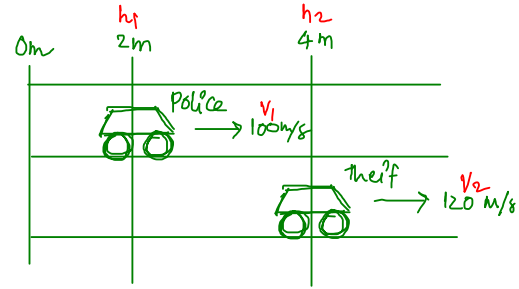
h_1 , h_2

V_1 , V_2

① $t = 0$, $h_1 == h_2$ → True

② $h_1 < h_2$ and $V_1 <= V_2$ → False

③ $h_2 < h_1$ and $V_2 <= V_1$ → False



will the police catch theif ?

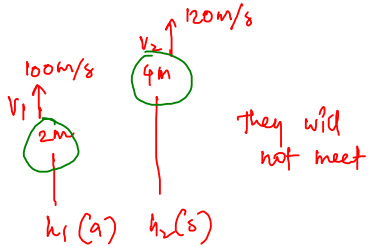
→ Never, why ?

Theif is already ahead of police and his speed is more than police speed.

Inorder to catch

police speed > theif speed ✓

If police speed <= theif sped ✗

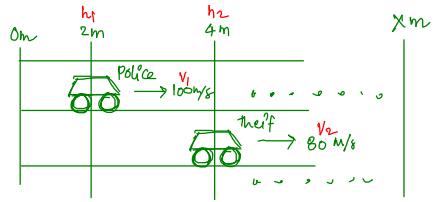


They will not meet

④ $h_1 < h_2$ and $V_1 > V_2$

(or)

$h_2 < h_1$ and $V_2 > V_1$



Assume after time 't' second they both meet at X m

Initially $t=0$, h_1, h_2

after T's $t=T$'s.

$h_1 New = h_1 + TV_1$

$h_2 New = h_2 + TV_2$

$\Rightarrow h_1 New = h_2 New$ at T's

$\Rightarrow h_1 + TV_1 = h_2 + TV_2$

$\Rightarrow TV_1 - TV_2 = h_2 - h_1$

$\Rightarrow T(V_1 - V_2) = h_2 - h_1$

$\Rightarrow \boxed{T = (h_2 - h_1)/(V_1 - V_2)}$ perfectly divide

→ yes the police will catch the theif (overtake ✓) (meet → check)

→ But give Qs is not ask overtaking if is ask meeting at same point

eg: $h_1 = 2m$ $h_2 = 4m$

$V_1 = 7 m/s$ $V_2 = 2 m/s$

$T = \frac{4-2}{7-2} = \frac{2}{5} = 0.4\,s$ ✗

* always 'T' (time) is a natural numbers (0, 1, 2, 3, ...)

Q: Check T is natural number or not ?

$\Rightarrow (h_2 - h_1) \,\%\, (V_1 - V_2) == 0$

$h_1 = 5m$ $h_2 = 7m$

$V_1 = 2m/s$ $v_2 = 3m/s$

$t=0$, $h_1 = 5m$, $h_2 = 7m$

$t=1$, $+2$ $7m$, $10m$ $+3$

$t=2$, $+2$ $9m$, $13m$ $+3$

$t=3$, $+2$ $11m$, $16m$ $+3$ $\rightarrow v_2$

$t=4$, $+2$ $13m$, $19m$ $+3$

$t=5$, $+2$ $h_{1\,new}$ $h_{2\,new}$

$= 5+2*5$ $= 7+3*5$ $= 7+15$

v_1 $= 15m$ $= 22m$

how many times $+V_1$

Time