

10.

Index of first 1 in an infinite Binary sorted array

0	1	2	3	4	5	6	7	8	9	10	11	12	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...

0	1	2	3	4	5	6	7	8	9	10	11	12	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...

$$l=r \quad a[r]=0 \quad r=r*2=2$$

0	1	2	3	4	5	6	7	8	9	10	11	12	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...

$$l=r \quad a[r]=0 \quad r=4$$

0	1	2	3	4	5	6	7	8	9	10	11	12	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...

$$l=r \quad a[r]=0 \quad r=8$$

0	1	2	3	4	5	6	7	8	9	10	11	12	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...

$$l=r \quad a[r]=0 \quad r=16$$

now find first occurrence of 1 in [9, 16]

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

$$l=9 \quad mid=12 \quad r=16$$

$a[mid]=1 \rightarrow$ This could be a possible answer

$first=12$ But first occurrence might be on left
 $\hookrightarrow r=mid-1$

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

$$l=9 \quad mid=12 \quad r=16$$

$a[mid]=0 \rightarrow$ Go right $\Rightarrow l=mid+1$

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

$$l=9 \quad mid=12 \quad r=16$$

$a[mid]=1 \rightarrow$ This could be a possible answer

But first occurrence might be on left

$$\boxed{first=11}$$

$$\hookrightarrow r=mid-1$$

$(\times l) \rightarrow$ Exit

Ans