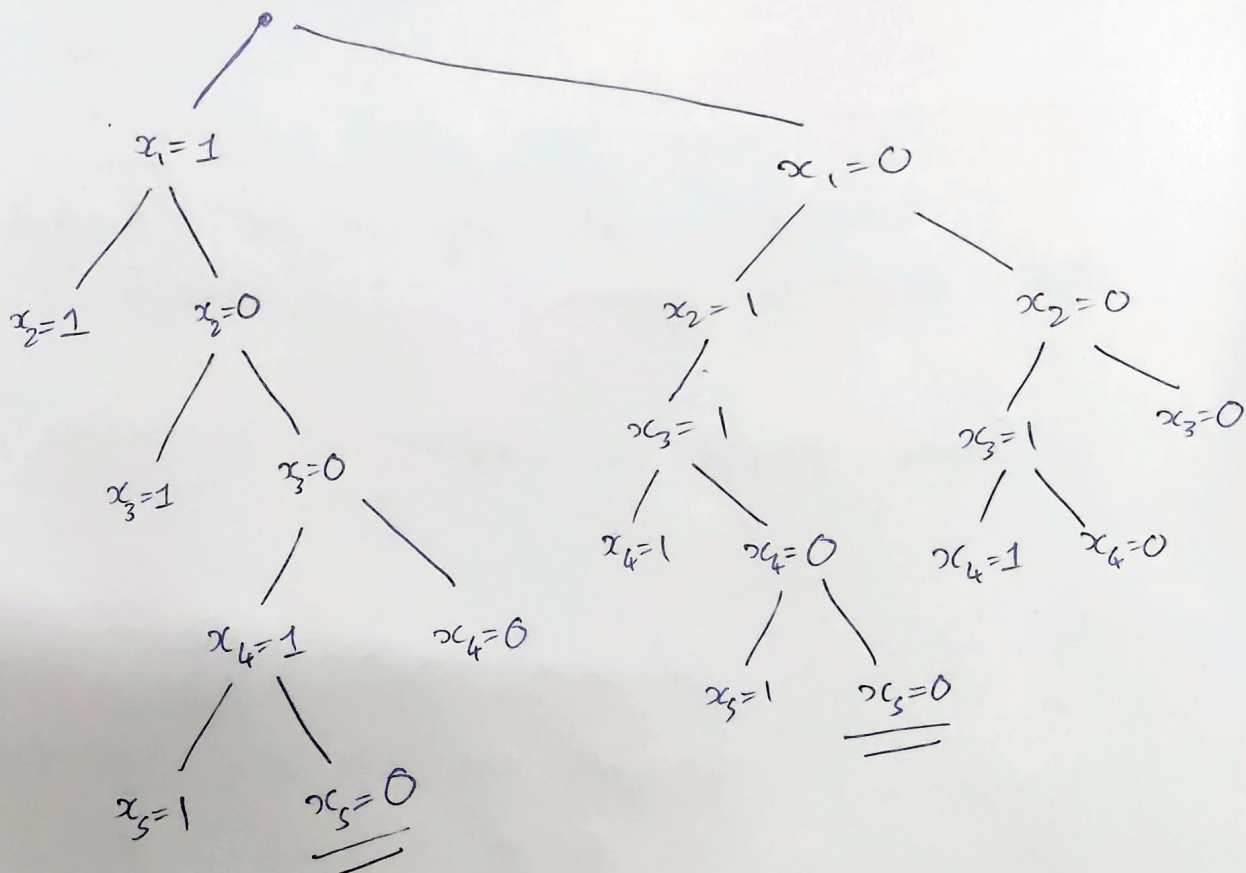


1)

			OWN PART						OTHER PART					
			a	b	c	d	e	f	a	b	c	d	e	f
Initialisation	$\{a, b, c\}$	$\{d, e, f\}$	1	2	1	1	2	1	1	1	1	1	1	1
After iter 1	$\{a, c\}$	$\{b, d, e, f\}$	0	1	0	1	3	1	2	2	2	1	0	1
After iter 2	$\{a, c, e\}$	$\{b, d, f\}$	0	0	0	0	0	0	2	3	2	2	3	2

2)

CTRG

- ```
OPT => DEC if value returned > k Yes
 else NO
```

Run for  $k = 1, 2, \dots, n-1$ . At most  $n$  runs. Return on first Yes.

Still polynomial.

Clearly a <sup>poly time verifiable</sup> certificate can be provided hence in NP.

- (b) Reduce from HAM CYCLE.

$$G(V, E) \longmapsto G'(V', E'), B, W$$

$\downarrow \qquad \qquad \downarrow$   
 budget weights

$G'$  is a complete graph

Weights are 2B for any edge  $e$  in  $E'$  if  $e \notin E$  otherwise weight 1.

$$B = 2$$

If cycle exists a tour of  $n$  cities possible else not. If no cycle forced to use an edge of weight  $2B$  which is not possible.



(b) In sorted order let  $j$  be the index where the loop breaks.

$$\text{do we have } \sum_{i=1}^j a_i \geq t$$

$$\text{clearly } \sum_{i=1}^{j-1} a_i < t$$



5) (a) Randomly choose 10 people.

$$P[\text{Leader}] = P[\text{Not leader}] = \frac{1}{2}$$

Hence  $\left(\frac{1}{2}\right)^{10}$ .

(b) 1. Use bloom filter to store sets  $K_1$  &  $K_2$  in  $C$ .

This is used to split the query  $K$ . Those in  $K_1$  sent to  $X_1$  and in  $K_2$  to  $X_2$ .

2. Now on server map documents to keyword with 1 bloom filter per document. where all of the keywords match return to  $C$ .

3.  $C$  finds common docs and returns.