

```
int count ulmmatched
int result = 0;
int count = 0;
int count_unma (string s) {
  if cs does not contain ")") return result;
     string substr = substring of S from char 0 to first ")";
if (number of "(" in substr == 1) {

return count_unma (substring of S after substr);
}
     else if (number of "(" in substr<1 & count <1) {
      t+ reult to;
        return count_unma (substring of s after substr);
      else if (number of "(" in substr< | & count > 1) {
     -- countes;
       return count-unna (substring of s after substr):
      plse {
         count = count + (number of "(" in substr) -1;
         return count unma (substring of s after substr);
```

3.	
C	a): inh halan (in) who are a few and in (in)
1	a): int bitsort (int +A, int n) {
- 1	int $i=0$; in+j=n-1; While $(i < j) < i$ in+j=n-1;
= (born of while (i) on i) duch to and
+ 1944	tont and shift (A [i] == 0) (in ship
OUT TOO	I be distrible by 3+15 which Bob Can
V42 1.	3 else if (Acj]==1) 1
	Mile by Aple to Au Are rest.
m-B	Table Steps Let 1984 to the total services
- 199 Pet	· · · · · · · · · · · · · · · · · · ·
7831243 13	CHIED (AFAIT, ACITY)
70 31	and to one complete the reportules one or two
	7
and	See born protrieve to a source and a see to
-	I aductive typ: Assume 11st invotor mod 3=2 Alice Will Win.
7)=3)	Industry Step: Let 1= kt2 , so n= ten mo
1 = (b): Loop invariant: At the beginning of the iteration, the left
3 (2)	t are not I and the right of 7 are not 0.
SNO 3	Therefore, at each iteration, if A [i] == 0, then itt still
PY	eserves the invariant; else if A [j] == 1, j also preserves the invarian
els	e if A[i]== & A[j]==0, swap A[i] & A[j] still preserves
	e invariant.
(c)	: Before the beginning of the iteration, the left of i are no
12	s and the right of g are not o's, and this still holds
07	fter each iteration. The loop terminates when i=j, which makes
+1	he list sorted since the left of i are all o's and right
0-	j's are all 1's.
()): When the loop terminates, AIJ = 1.
la): WHEN THE LOOP ICH MINISTERS (1)
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4. (a): At the A
Description Base save: N=1 then Alive will win
Proof: Base case: n=1, then Alive will win. Nyp. n=2, then Alive will win.
Inductive step: @ Assume n=k, that k mod 3=1, and
Alrie will win. Alice will take one first, then the left
(1) will be disysible by 3, in which Bob can not win, cause
either he takes one or two, will always make
Alile be able to get the rest.
Inductive step: let n=Rt1, that km then 10000
to n mod 3= (k+1) mod 3= 2. Then Alice will
take 2 first, to keep the rest be divisible by 3. Bob cannot uin regardless one or two he usli take
POD CANNOT UM FEGURATES OF ST.
Inductive hyp.: Assume n=k, that k mod 3=2, and
Alize will WID.
Inductive Step: Let n=k+2, so n=k+2 n mod 3 = (k+2) mod 3
thus, Alice will take one first, to no keep the rest be
In all 1 2 Rote Eithou Boh taker one or two will
always leave one two or one for Alice to pick, Alice will always win.
pick Alice will always win.
pier pina
Invariant: Alice will always keep the remaining links be divisible by
Invariant: Africe will always help the remaining
ma dylar 3. 5 mally saturated good and mismate was 1.74
of its are all the
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(1): When the Imp terminates, Act 1 = 1.

	(b): When n=3, Bob will win: Alive takes one, Bob takes 2; Alive takes 2, Bob take
	1
	when n>3 if n is even: Then Bob can just take the same number of Alive did, and take the linkapphan is care)
	symmetric to Allie took. E.G. Symmetric symmetric
	if n is odd: Then Bob will take to one if Alive first takes two, and Bob will take two if Alive first takes one; also, Bob will take the Link to divide the remaining unks to be two equal number of Links. Then, the remaining n would be even, take Bob can take symmetric stated above.
5.	take symmetric stated above.
	(a): Since there are $(256+256^2+256^3)=16843008$ possible three characters strings, and there are $2^{16}-1=655385$ total slots, thus, if we are going to insert all 16843008 into 65535 slots, each state there is going to be a slot with at least $\frac{16843008}{65535} \approx 257$ elements (strings).
	(b): When the permutation works to make the distances of every character's V in the new string to its original position in the original string are all even numbers, then those two strings will be hashed into the same slot. Since the permutation will make the difference of those two strings to be divisible by $2^{16}-1=65535$.