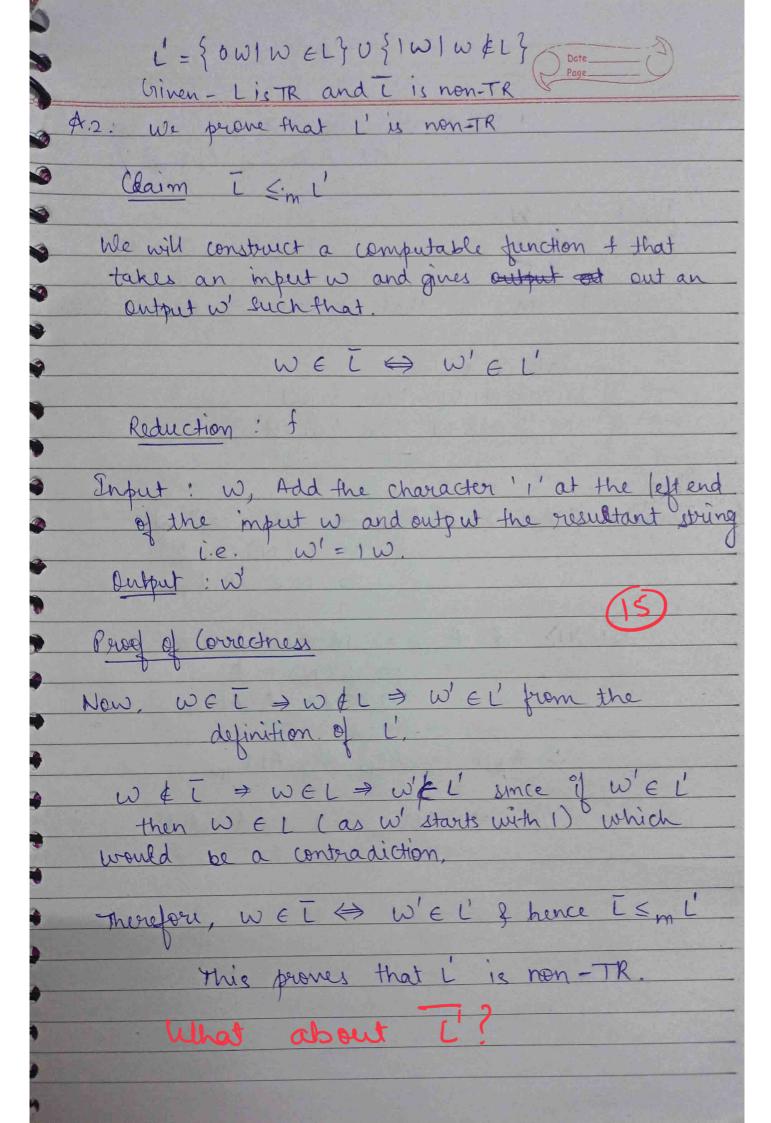
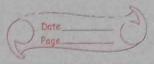


Price of Correct ness € € L(M) → M, accepts € in finite number of Steps > M, takes fever steps ton than Mont E. E & L(M) > M, goes into an or loop on E > M takes same number of steps as Mz on E Therefore, $\epsilon \in L(M) \Leftrightarrow M$, takes fewer steps than My on E and hence LESm Li. This perones that I is undecidable. gus(b) Input <M> 1. On every input of length atmost 23 for at most 23 40 stepl. 2. 4 M accepts any such input within thestime, then 'accept' else reject" Note that if an input is accepted within 2340 steps then only the first 2340 bits of the input are of any relevance to own algorithm. Hence we need to consider only inputs of length at most 2340 > Decidable Ans.(c) Every TM as infinitely many equivalent TMs.

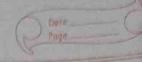
nence every TM is accepted. I We have to chick weather whether the input correctly encodes a TM or not > Decidable

1.6) Consider.
FIN = { < M > L (M) is infinite?
ule have: FIN is undecidable.
-> FIN < m L ₄
Me will construct a computable function & f
that & takes as input <m> and produces an output</m>
<m, m2=""> such that +(M) is infinite -</m,>
L(M) is $\infty \iff L(M_1) \cap L(M_2)$ is ∞
The state of the s
Reduction function J.
Input (M)
1. let M, := M
2. Construct a TM M2 that accepts all inputs (LIM2)= E
Proof of Correctness. (5)
L(M) is infinite (L(M)) NE" is a (L(M)) NL(M2) is
> L(M) is a (>) L(M) / L(M2) is and hence
FIN Sm Lq. Hence L ₄ is undecidable
4





Page	
$A_{3}(a)$ $f: \langle M, \omega \rangle \rightarrow \langle N \rangle$	
ATM INFINITEM	
Input: <m, w=""></m,>	
Output: (N)	
Construct TM N that on input x does the follow	wing.
- Simulate MorW.	
-> 3/ M rejects W then "reject"	
→ 31 M rejects W then "reject" → 41 M accepts W then check if x is of the for	
) If it is of the form o' i' then accept otherwise	rojec
Perod:	
D < M, W> E ATM => M accepts W.	
$\Rightarrow W(N) = \{0,1,1,1,2,0\}$	
⇒ <n> ∈ INFINITETM</n>	
$(M, W) \not= A_{TM} \Rightarrow M$ dosen't accept W $\Rightarrow W(N) = \phi$	
=> (N) & E INFINITEM	
The Total Comments of the Comm	
Munce ATM SM INFINITETM	
. It is undecidable	



A.3(b) 1: < M, W> -> < N> (FOR ATM & M ALLIM) Input : < M, W> Output: (N) Construct TM N that on input & double following - limulate Mon W -> If M reject W then "reject"

-> If M accepts W then "accept". Proof: <M, W> ∈ ATM → M accept W → L(N) = E* <M, W> \(A \tau \rightarrow M dozen't accept W \rightarrow L(N) = \(\Pri \) > <N> & ALLIM is A IN SM ALL TM -> All m is undecidable