1. True or False? (5 Marks)

a) Every regular language is context-free
b) The language {03n@02n#0n, n>=0} is not context free
c) The class of context free languages is not closed under intersection
d) A language is recursively enumerable iff some Turing machine recognizes it.
e) A language is recursive iff some Turing machine decides it
f) Turing machines with multiple tapes are more powerful in their ability to compute than Turing Machines with just one tape.
g) A Multitape Turing machine is a 7-tuple.
h) An enumerator does not need to halt
i) Any computable problem could be solved with a single tape Turing machine.
j) All computational models give the same notion of an algorithm

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Question	a	b	c	d	e	f	g	h	i	j
Answer : (T/F)	F	F	T	T	T	F	T	T	T	T

2. Give a context free grammar that generates the language A = {ww^R : w ∈ {a, b}* }. **(3 marks)**

S → wB | B
B → w^R | a | b

?

3. Prove that if a language A and its complement ¬A are recursively enumerable, then A is decidable

(7 marks)

A and ¬A are recursively enumerable
I assemea the A is non recursively enumerable
if A non-recur that meening
A is non-decidable if this ~~the~~ then
then ¬A is recur but A non recu

this is a condhidtion because I asseome A non-recur and I get ¬A is recur enumerable then I now A and ¬A are same

4. Prove using the pumping lemma that the language $L = \{a^n b^n c^n , n \geq 0\}$ is not regular (**8 marks**)

* 5 Steeps *

1) $L = \{a^n b^n c^n , n \geq 0\}$

2) $\nexists \exists \; p \in L$ AND $|xy| \leq p$ & $|y| \geq 1$

3) $\exists \; S \in L \Rightarrow |S| \geq p$

4) ~~Pike~~ Pick $S = xyz$ where $xy^i z$ & $i \geq 1$

5) now we can write

$xy^0 z$ is a condhidction

for $S = xy^i z$ & $i \geq 1$

we have 2 propabilte :

for ~~I~~ assume L is non-Regular

i) y only a's or b's or c's

but this ~~but~~ false because y never can c's only, this is ~~cond~~ condhaction

ii) y contanc more from a's ~~or~~ and b's and c's

but this false because bac false for Example order important this is condhaltion