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

4/5

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 assemed 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

2

this is a condition 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 ∄ assume L is non-Regular

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

but this false because y never can c's only3 this is ~~cond~~ condhaqtion

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