

# [Computability](https://assignbuster.com/computability/)

1. Consider the language given by the regular expression a\*bc\*. (a) Give a JFLAP implementation of a DFA that recognises this language, and test it on a suitable set of test data. (You need not include screen shots for each test screen, just give the trace of the DFAs behaviour on each.) (4 marks)   
(b) Give a Type 3 grammar for this language and show how it produces those strings in your test data, which are accepted by your DFA. (4 marks)   
S => => aA   
=> bB   
=> bC   
=> b   
A=> bB   
=> bC   
=> b   
B=> aA   
=> bB   
=> bC   
C=> b   
=> aA   
=> bB   
=> cC   
=> b   
2. Consider the language {anbcn| n>= 1}.   
(a) State the pumping lemma for regular languages and use it to show that this language is not regular. (4 marks)   
Assume L={anbcn| n>= 1} is a regular language. Then pumping lemma holds.   
Let p be the pumping length for L given by the lemma.   
We choose S= apbcp {in L of length >= p}   
Consider all cases s can be divided into x, y, z such that s= xyz satisfying conditions of the pumping lemma | y| > 0 and | xy| s= abic for all i >= 0, lets take i= 0   
s= ab0c ==> s= ac   
Therefore, L is not a regular language because s= ac does not satisfy the pumping lemma.   
(b) Show that this language is context free by giving a CFG for this language. (3 marks)   
L = {anbcn| n>= 1}   
CFG = {V,{a, b, c}, P, S}   
P:   
S => abc   
S => aSc   
  
  
The lemma does not satisfy the language as a context-free grammar.   
3. Consider the language {anb2ncn}.   
(a) State the pumping lemma for context free languages and use it to show that this language is not context free. (7 marks)   
L= {anb2nc}   
CFG = { V, {a, b, c}, P, S }   
P:   
S => abbc   
S => aSbbc   
S => aSbc   
The lemma does not satisfy the language as a context-free grammar.   
(b) Give a JFLAP implementation of a Turing Machine that decides this language, and test it on a suitable set of test data.