Part1

Deterministic language is a very broad concept. As long as the language is deterministic, it can be said that the language is a deterministic language [Korenjak], that is, it only needs to satisfy one characteristic of determinism. Determinism is relative to uncertainty. Uncertainty is a comprehensive feature of speech, and users are accustomed to living with it, we can even consider it an indispensable feature of verbal communication. For example, when asked where you live, you just answered a no The exact address, but it doesn't affect your answering the question. You also usually just answer customary expressions like living near roses and crowns. However, this was no problem for the friend, as many other factors besides the label, including her local knowledge, were taken into account when determining where to refer. If it were a question, she might ask: 'Which rose and crown? Secondly, a context-free language is a language that can be recognized out of context and can also be recognized out of context. A context-free language is a formal language that can be defined by a context-free grammar[Knuth]. The set of all context-free languages ​​is the same as the set of languages ​​accepted by the pushdown automaton[Ginsburg]. Deterministic languages ​​contain deterministic context-free languages, and context-free languages ​​also contain deterministic context-free languages. I think they are a cross-relationship, some context-free languages ​​are deterministic and some are not.

Knuth, D. E. (1968). Semantics of context-free languages. *Mathematical systems theory*, *2*(2), 127-145.

Ginsburg, S., & Greibach, S. (1965, October). Deterministic context free languages. In *6th Annual Symposium on Switching Circuit Theory and Logical Design (SWCT 1965)* (pp. 203-220). IEEE.

Korenjak, A. J., & Hopcroft, J. E. (1966, October). Simple deterministic languages. In *7th Annual Symposium on Switching and Automata Theory (swat 1966)* (pp. 36-46). IEEE.

Part2

S-> cAb | aC

A->aA | bb

C->bC | a

ε,C->b

ε,ε->C

ε,ε->a

ε,S->C

ε,S->ε

ε,ε->S

ε,S->b

ε,A->a

ε,ε->c

ε,ε->A

ε,ε->b

ε,A->b

Part3

L is not context free language.

Assume L is CFL,we apply the pumping lemma. = uvw

u = , v = ,w=,

|uv| n => a +b + c n

|v| 1 => b + c 1

For i = 0 fails ,

uw = L , so d = 2a, 2a = n-b

since a +b + c n, we can get a + c n- b ,so a + c 2a ,c a, but c must bigger than a .

Part4

The language is CFG , but is not linear.

S->AB

A->1A0 | λ

B->B2|λ

The right-hand side have 2 nonterminal .