**CSC 360 Homework 4**

Posted on Oct. 2, 2020 Due one: Oct.15, 2020

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Download this Word file and insert your answer in the same word document, then upload the Word file to** [**Canvas**](https://uncw.instructure.com/login/ldap)

1. (End of Chapter 4, Exercise 1, page 138)

 **Remove lambda rules from the following grammar**. Your answer must include the NULL set.

$$S \rightarrow aS | bS | B$$

$$B\rightarrow bb | C | λ $$

$$C \rightarrow cC | λ$$

1. (End of Chapter 4, Exercise 9, page 138)

 **Remove chain rules** **from the following grammar**. Your answer must include the CHAIN(S), CHAIN(A), CHAIN(B), and CHAIN(C).

$$S \rightarrow A | C$$

$$A \rightarrow aA | a | B$$

$$B \rightarrow bB | b$$

$$C \rightarrow cC | c | B$$

1. (End of Chapter 4, Exercise 14, page 139)

 **Remove useless symbols from the following grammar.** Your answer must include the TERM and REACH sets.

$$S \rightarrow AA | CD | bB$$

$$A \rightarrow aA | a$$

$$B \rightarrow bB | bC $$

$$C\rightarrow cB$$

$$D \rightarrow dD | d$$

1. (End of Chapter 4, Exercise 18, page 140)

**Convert the following grammar into Chomsky Normal Form**

$$S \rightarrow aA | ABa$$

$$A \rightarrow AA | a$$

$$B \rightarrow AbB | bb$$

1. (End of Chapter 4, Exercise 29, page 141)

**Transform the following grammar to a grammar without left-recursive rules**.

$$S \rightarrow A | B$$

$$A\rightarrow AAA | a | B$$

$$B \rightarrow BBb | b$$