

COSC 312
Homework Assignment 2
Submission Format: docx, tex or pdf to Canvas
Points: 1(15), 2(15); total = 30

Name: _____ Netid: _____

1. Each of the following languages is the intersection of two simpler languages. In each part, construct DFAs for the simpler languages, then combine them using the Cartesian Product of the two DFAs and produce a final state diagram (reducing the number of states where possible) for the complete language. Assume the alphabet $\Sigma = \{a,b\}$.
 - a. $\{w \mid w \text{ has at least 3 a's and at least 2 b's}\}$
 - b. $\{w \mid w \text{ has an even number of a's and 1 or 2 b's}\}$
 - c. $\{w \mid w \text{ starts with an a and has at most 1 b}\}$

(over)

2. Each of the following languages is the complement of a simpler language. In each part, construct a DFA for the simpler language, then use it to produce a final state diagram for the original language (the ones shown below). Assume the alphabet $\Sigma = \{a,b\}$.
- $\{w \mid w \text{ contains neither the substrings } ab \text{ nor } ba\}$
 - $\{w \mid w \text{ is any string not in } a^*b^*\}$
 - $\{w \mid w \text{ is any string not in } (ab^+)^*\}$