Assignment 2

CS 581
Due October 11, 2018

Problem 1 [10 point] Give a Context-free grammar for the **complement** of the following language:

$$\{a^n b^n \mid n \geq 0\}$$

(Note that while the class of Context-free languages is not closed under complement, this particular language is Context-free)

Problem 2 [10 point] If A and B are languages, define $A \diamond B = \{xy \mid x \in A \text{ and } y \in B \text{ and } |x| = |y|\}$. Prove that if A and B are Regular languages then $A \diamond B$ is a Context-Free language.

Probem 3 [10 point] Prove or disprove. The class of Context-Free languages is closed under the **perfect shuffle** operation defined in assignment 1.