

## CSCI 510, Fall 2016, Homework # 2

YOUR NAME HERE

Due date: Friday, October 21, Midnight

1. Let  $A/B = \{w|wx \in A \text{ for some } x \in B\}$ . Show that if  $A$  is context free and  $B$  is regular then  $A/B$  is context-free.
2. For any language  $A$ , let  $\text{suffix}(A) = \{v|uv \in A \text{ for some string } u\}$ . Show that the class of context-free languages is closed under the *suffix* operation.
3. Show that if  $G$  is a CFG in Chomsky normal form, then any string  $w \in L(G)$  of length  $n \geq 1$ , exactly  $2n - 1$  steps are required for any derivation of  $w$ . Give a proof by induction.