

## Problem Set 2

These are practice problems on the subject of context-free languages. The relevant chapter in Sipser's book is Chapter 2.

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**Problem 1** Let  $A$  be the language of Exercise 2.4 part (b), page 120 of the text. Give a context-free grammar that generates  $A$  and also give the state diagram of a PDA that recognizes  $A$ .

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**Problem 2** Let  $A$  be the language of Exercise 2.4 part (f), page 120 of the text. Give a context-free grammar that generates  $A$  and also give the state diagram of a PDA that recognizes  $A$ .

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**Problem 3** Prove that the class of context-free languages is closed under the concatenation operation.

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**Problem 4** Let  $A$  be the language of Exercise 2.6 part (b), page 120 of the text. Give a context-free grammar that generates  $A$  and also give the state diagram of a PDA that recognizes  $A$ .

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**Problem 5** Problem 2.18 part (a), page 121 of the text.

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**Problem 6** Problem 2.18 part (c), page 121 of the text.

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**Problem 7** Exercise 2.17 part (a), page 121 of the text.

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