Homework 8
Com S 331, Spring 2017
Due date: **Wednesday, March 29, 2017**
Please submit the homework via BlackBoard **before the class that day**.

Note: All submissions should be **typed** and in .pdf or .doc(x) format. However, state diagrams can be drawn with hand and presented in the final manuscript as images. We recommend to use Latex for typing homeworks. You **do not** need to formally prove the correctness of your constructions unless a question specifically asks to do so. However, in most cases you need to present a reasonable justification of correctness.

Total points available: 85

0. Read pages 130–146 of Section 2.4 in the class-book (Sipser, **3rd** edition).

1. **(25 points)** Prove that if a grammar is *ambiguous*, then it is **not** deterministic. Use the definition of deterministic CFGs via *forced handles* (see Definition 2.47 in the class-book).

2. **(60 points)** Use the DK-test to determine whether the following grammars are deterministic or not:

   (a) **(20 points)**

   $$R \to S \mid T$$
   $$S \to aSb \mid ab$$
   $$T \to aTbb \mid abb$$

   (b) **(20 points)**

   $$S \to T \dashv \mid \dashv$$
   $$T \to aTb \mid ab$$

   (c) **(20 points)**

   $$S \to T \dashv$$
   $$T \to TaTb \mid TbTa \mid \varepsilon$$

   Present diagrams of the respective DFAs DK (see Examples 2.53 and 2.55 in the class-book), and justify your conclusions.