

Homework 8 — due Tuesday, April 4

**Problem 1** Exercise 16.1–1, page 308 of CLR.

**Problem 2** Exercise 16.4–2, page 324 of CLR.

**Problem 3** Consider the following (Chomsky normal form) context-free grammar:

$$\begin{aligned} S &\rightarrow AB \mid BC \\ A &\rightarrow BA \mid a \\ B &\rightarrow CC \mid b \\ C &\rightarrow AB \mid a \end{aligned}$$

Apply the dynamic programming algorithm presented in class to decide whether the string *aaaaa* is generated by the grammar or not.

**Problem 4** Exercise 16–2, page 324 of CLR.

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### Extra Credit Programming Assignment

Implement (in C, C++, or Java) the dynamic programming algorithm presented in class for deciding whether an input string is generated by a given context-free grammar in Chomsky normal form. (See also the proof of Theorem 7.14, pages 240–241, in Sipser’s book.) To receive the extra credit (up to 5% of the whole grade), you must turn e-mail your code to `mandoiu@cc` by midnight **Thursday, April 13**.

Your program should read the input in the format used in the following example.

```
TERMINALS: ab
VARIABLES: SABC
START: S
S->AB
S->BC
A->BA
A->a
B->CC
B->b
C->AB
C->a
STRING: abab
```

The output should be “YES” if the given string is generated by the grammar, and “NO” otherwise.