COMP 455
Models of Languages and Computation
Fall 2021
Homework 7
Due Thursday, November 11, 2021

1. Consider the context-free grammar $G = (V, \Sigma, R, S)$ where $V = \{S, P, Q, a, b, c, d\}, \Sigma = \{a, b, c, d\}$, and R contains the following rules:

$$S \to PQ$$
$$Q \to dQb$$
$$Q \to b$$
$$P \to cPa$$
$$P \to c$$

Construct a push-down automaton $M = (K, \Sigma, \Gamma, \Delta, s, F)$ obtained from this grammar using the construction of lemma 3.4.1 in the text, also reproduced in the course notes at the beginning of this lecture:

http://www.cs.unc.edu/ plaisted/comp455/slides/pdacfg3.4.pdf

Give the set Δ of transitions as a sequence of elements of the form $((p, a, \beta), (q, \gamma))$. Also say what K, Σ, Γ, s, and F are.

For this homework you may work in groups of up to four people and groups are encouraged to turn in only one paper with everyone's names in the group on it. This will make the work of the grader easier.