# Computer Science 411
## Homework 6: PDA
### Fall 2015
### Due Friday, October 16th, 2015

1. For each of the following languages, give a push-down automaton.

    (a) (4 points) $\{a^n b^{3n} : n > 0\}$

    (b) (4 points) $\{a^n x : n \geq 0, x \in (a+b)^*, |x| = n\}$

    (c) (4 points) $L =$ all strings over $\{a, b\}$ that do not contain the substring $bba$

    (d) (4 points) $L =$ Valid prefix operations over the alphabet 1, 2, 3, -, /. Examples:

    | $\in L$ | $\notin L$ |
    |---|---|
    | 3 | - 2 3 1 |
    | - 1 2 | / 2 |
    | - - 3 2 - 1 3 | - - 3 2 - 2 |

2. (8 points) Give both a CFG and a PDA for the language $L$ All strings over $\{0, 1\}$ that are *not* of the form $0^n 1^n$. $L = \overline{\{0^n 1^n : n > 0\}}$. Thus, $001, 100, 1001, 0110 \in L$, while $01, 0011, 000111 \notin L$