Homework #6

#1. a) $\mathcal{L}$(DFA) = $\mathcal{L}$ (NFA) True False

b) $\mathcal{L}$(DPDA) = $\mathcal{L}$ (NDPDA) True False

c) A CFG grammar can be converted to an equivalent PDA with no more than 3 states
True False

d) If a language is accepted by a dfa, it will be accepted by a PDA True False

e) PDA's can be described as a 5-tuple, a 6-tuple or a 7-tuple True False

#2. Given the PDA, M = ($\{q_0, q_1, q_2\}$, {a,b,c}, {a,b,c,$}, δ, q_0, $, $\{q_2\}$)

$\delta(q_0,a, \$) = (q_0, a\$)$
$\delta(q_0,b, \$) = (q_0, b\$)$
$\delta(q_0,a, a) = (q_0, aa)$
$\delta(q_0,b, a) = (q_0, ba)$
$\delta(q_0,a, b) = (q_0, ab)$
$\delta(q_0,b, b) = (q_0, bb)$
$\delta(q_0,c, \$) = (q_1, \$)$
$\delta(q_0,c, a) = (q_1, a)$
$\delta(q_0,c, b) = (q_1, b)$
$\delta(q_1,a, a) = (q_1, \lambda)$
$\delta(q_1,b, b) = (q_1, \lambda)$
$\delta(q_1, \lambda, \$) = (q_2, \$)$

a) Draw the transition graph for M

b) Show a computation on

(i) *abcba*

(ii) *acaa*

c) Describe L(M)

#2 Given the PDA

$$M = (\{q_1\}, \{\underline{)}, \underline{(}\}, \{\$, \underline{(}\}, \delta, \$, \{\})$$

$$\begin{aligned}
\delta(q_1, \underline{(}, \$) &= \{(q_1, \underline{(})\} \\
\delta(q_1, \underline{(}, \underline{(}) &= \{(q_1, \underline{(})\} \\
\delta(q_1, \underline{)}, \underline{(}) &= \{(q_1, \lambda)\} \\
\delta(q_1, \lambda, \$) &= \{(q_1, \lambda)\}
\end{aligned}$$

(Note the parentheses have been underlined when they are inputs and not metasymbols for grouping)

a) Show the graph version of these transitions

b) Show a computation on the string "( )"

c) Show a computation on the string ") ("

d) What is L(M)?

#3. a) Construct a PDA to accept $\{ 0^n 1\ 2^n \mid n \geq 0$

#4. a) Convert the following grammar to an equivalent NPDA.

S → 0 S 1 | A
A → 1 A 0 | S | λ

b) Show both a derivation and a computation of *011001*

#5. Convert the PDA of page 68 from Grahne Slides part 1 to a CFG