Q1) a context free grammar will
provide an efficient solution
to solve the problem of
make sure there are no
wrong pairs

$$S \rightarrow (S) \mid [S] \mid \{S\} \mid \lambda$$

Q2)

$C, \varepsilon / C C$ $\varepsilon, C / \varepsilon$ day/date:

$C, 20 / C 20$

$C, C / C C$

$\varepsilon, 20 / \varepsilon, 20$ $), C / \varepsilon$

$C, 20 / C, 20$ $], C / \varepsilon$

CC / CC

$\varepsilon, 20 / 30 \Rightarrow$ q_0 $], C / \varepsilon \rightarrow$ q_d z_0

$], C / \varepsilon$

$\varepsilon 20 / 20$ $\varepsilon, 20 / 20$

~~$\varepsilon, 20 / 30$~~

$C, C / C C$

$C, 20 / C 20$

$C, C / C C$

$C, C / C C$

$C, 20 / C 20$

Q3/

CFG :

$$S \rightarrow S_1 1.$$
$$S_1 \rightarrow 0S_1 1 \mid \varepsilon.$$

$$S_1 1 \rightarrow 0S_1 11 \rightarrow 00S_1 111$$
$$\rightarrow 00111.$$

PDA :

$q_0 \xrightarrow{\ 1, \lambda \rightarrow \lambda\ } q_1$

$0, \lambda \rightarrow 0$ (loop on q_0)

$1, 0 \rightarrow \lambda$ (loop on q_1)