6.2.1 b

Design a PDA to accept the set of all strings of 0’s and 1’s such that no prefix has more 1’s than 0’s.

$P = (Q, \Sigma, \Gamma, \delta, q_0, Z_0, F)$, $P$ accepts by final state

$Q = \{q_0\}$
$\Sigma = \{0, 1\}$
$\Gamma = \{0, Z_0\}$
$F = \{q_0\}$

$\delta(q_0, 0, 0) = \{(q_0, 00)\}$ \hspace{1cm} \text{On 0 input, push a 0 onto the stack}
$\delta(q_0, 0, Z_0) = \{(q_0, 0Z_0)\}$

$\delta(q_0, 1, 0) = \{(q_0, \varepsilon)\}$ \hspace{1cm} \text{On 1 input, pop a 0 from the stack}$

When the only thing on the stack is $Z_0$ then the number of 0’s equals the number of 1’s. If the string contains another 1 in this situation then the machine will get stuck and die since

$\delta(q_0, 1, Z_0) = \emptyset$