\[ E_e \rightarrow aO_e \]
\[ E_e \rightarrow bE_0 \]
\[ O_e \rightarrow bO_0 \]
\[ O_e \rightarrow aE_e \]
\[ E_0 \rightarrow bE_e \]
\[ E_0 \rightarrow aO_0 \]
\[ O_0 \rightarrow aE_0 \]
\[ O_0 \rightarrow bO_e \]
4. Use the general algorithm to transform the following pushdown automaton into a context-free grammar. This automaton has 4 states:

- the starting state $s$,
- the reading state $r$,
- the checking state $c$, and
- the final state $f$.

The transitions are as follows:

- From $s$ to $r$, the transition is:
  $\varepsilon, \varepsilon \rightarrow \$$
- From $r$ to $r$, the transitions are:
  $0, \varepsilon \rightarrow 1$
  $1, \varepsilon \rightarrow 0$
- From $r$ to $c$, we have a jump $\varepsilon, \varepsilon \rightarrow \varepsilon$
- From $c$ to $c$, the transitions are:
  $0, 0 \rightarrow \varepsilon$
  $1, 1 \rightarrow \varepsilon$
- From $c$ to $f$, the only transition is:
  $\varepsilon, \$$ \rightarrow \varepsilon$

Show, step-by-step, how the resulting grammar will generate the sequence 0101.
5. Show, step by step, how the stack-based algorithm will transform the expression $5 - (3 - 7)$ into a postfix expression, and then how a second stack-based algorithm will compute the value of this postfix expression.
6. For the grammar from Problem 1, show how the word $dcdc$ can be represented as $uvxyz$ in accordance with the pumping lemma for context-free grammars. Show that the corresponding word $uvvxyyz$ will be generated by this grammar.