Parts of strings (Solutions)

1 Substrings

Exercise 1.
For each one of the gaps below, enter $\sqsubseteq$, $\sqsubsetneq$, or $\not\sqsubseteq$ depending on whether the first string is a substring of the second string, a proper substring, or neither:

1. a_aaaa
2. a_b
3. ε_b
4. ε_ε
5. aa_abbbca
6. bc_abbbca
7. cb_abbbca

Solution

1. $a \sqsubsetneq aaaa$
2. $a \not\sqsubseteq b$
3. $\varepsilon \sqsubsetneq b$
4. $\varepsilon \sqsubseteq \varepsilon$
5. $aa \not\sqsubseteq abbbca$
6. $bc \sqsubsetneq abbbca$
7. $cb \not\sqsubseteq abbbca$

2 Subsequence

Exercise 2.
For each one of the gaps below, enter $\sqsubseteq$, $\sqsubsetneq$, or $\not\sqsubseteq$ depending on whether the first string is a subsequence of the second string, a proper subsequence, or neither:

1. a_aaaa
2. a_b
3. ε_b
4. ε_ε
5. aa_abbbca
6. bc_abbbca
7. cb_abbbca

Solution

1. $a \sqsubsetneq aaaa$
2. $a \not\sqsubseteq b$
3. $\varepsilon \sqsubsetneq b$
4. $\varepsilon \sqsubseteq \varepsilon$
5. $aa \sqsubsetneq abbbca$
6. $bc \sqsubsetneq abbbca$
7. $cb \not\sqsubseteq abbbca$

Exercise 3.
Say whether the following is True or False: Every substring of some string s is also a subsequence of s, but not the other way round. Justify your answer.

Solution

This is correct. Suppose $u := u_1 \cdots u_n$ is a substring of some string s. Then it must be the case that u_1 appears before $u_2, u_3, \ldots, u_n$, u_2 appears before $u_3, \ldots, u_n$, and so on. But this is all that is required for $u_1 \cdots u_n$ to be a subsequence of s.