

Problem 1.68. In the traditional method for cutting a deck of playing cards, the deck is arbitrarily split into two parts, which are exchanged before reassembling the deck. In a more complex cut, called Scarne's cut, the deck is broken into three parts and the middle part is placed first in the reassembly. We'll take Scarne's cut as the inspiration for an operation on languages. For a language A , let $CUT(A) = \{yxx \mid xyz \in A\}$.

Part a. Exhibit a language B for which $CUT(B) \neq CUT(CUT(B))$

Let $\Sigma = \{a, b\}$ and $B = \{baab\}$. $CUT(B) = \{abab, aabb\}$, whereas $CUT(CUT(B)) = \{baab, aabb, abab\}$.

Part b. Show that the class of regular languages is closed under CUT .

Proof. Solution Replace this text with the details of your proof or solution. □