

Please place your net ID in upper right corner of your homework

1. Given $L = (0 + 10)^*$, $h(a) = 00$, and $h(b) = 01$. Determine $h(h^{-1}(L))$? Show that your answer for $h(h^{-1}(L))$ is contained in L .
2. Which of the following is true for all sets L and homomorphisms h : $h(h^{-1}(L)) \subseteq L$ or $h(h^{-1}(L)) \supseteq L$. Give a convincing informal proof for your answer.
3. Given a book in machine readable form, explain using h , h^{-1} , and $\cap R$ how you would extract all theorems but not proofs. $\cap R$ means intersection with regular sets. A few sentences should be sufficient.
4. Write out the machine construction that the class of regular sets is closed under homomorphisms. Let $M = (Q, \Sigma, \delta, q_0, F)$ be a finite automaton and specify the automaton accepting $h(L(M))$.
5. Let s be a substitution of regular sets for symbols and let R be a regular set. Is $s^{-1}(R)$ a regular set? Give a convincing argument for your answer.