

Module 4: Assignment 1

April 18, 2022

1. Show that PCP with two lists $x = (01, 1, 1), y = (01^2, 10, 1^1)$ has a solution or not.
2. Prove that PCP with two lists $x = (01, 1, 1), y = (01^2, 10, 11)$ has no solution.
3. Does the PCP with two lists $x = (b, bab^3, ba)$ and $y = (b^3, ba, a)$ have a solution?
4. If L is a recursive language over Σ , show that $\bar{L}$ is also recursive ($\bar{L}$ is defined as $\Sigma^* - L$).
5. If L and $\bar{L}$ are both recursively enumerable. Show that L and $\bar{L}$ are recursive.
6. Show that the union of two recursively enumerable languages is recursively enumerable and the union of two recursive languages is recursive.
7. What is the difference between a recursive language and a recursively enumerable language?
8. What do you mean by saying that the halting problem of TM is undecidable?
9. Describe $A_{DFA}, A_{CFG}, A_{CSG}, A_{TM}$, and $HALT_{TM}$.
10. State properties of Recursive Language under Intersection, Union, Concatenation and Complementation.
11. What do you mean by recursive and recursively enumerable language? When does a problem is called decidable?