CMPSC 464: Introduction to the Theory of Computation **Date: 09/07/2022**

Recitation #2

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Problem 1

1. Let $B = \{1^k y : y \in \{0,1\}^*, y \text{ has at least } k \text{ 1's } k \geq 1\}$ Show that B is regular
2. Let $C = \{1^k y : y \in \{0,1\}^*, y \text{ has at most } k \text{ 1's } k \geq 1\}$ Show that C is not regular

Problem 2

Say that string x is a prefix of string y if a string z exists where $xz = y$ and that x is a proper prefix of y if in addition $x \neq y$. Show that the class of regular languages is closed under the following operation:

$$NOEXTEND(A) = \{w \in A : w \text{ is not the proper prefix of any string in } A\}.$$

Problem 3

For $L \subseteq \{0,1\}^*$ a language, let $S(L) = \{y \in \{0,1\}^* : \exists x \in \{0,1\}^* \; xy \in L\}$. Prove that the class of regular languages is closed under operation S.