

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider the regular language L given by the regular expression $a(a + b)^*b + ba$.

(a) Create an NFA accepting the language L .

(b) Use your NFA of Part (a) to construct a regular grammar G producing the language L .

2. (a) Use the Pumping Lemma for regular languages to show that the language

$$L = \{a^n b^k : n, k \in \mathbb{N}, n \leq k\}$$

is not regular.

- (b) Use Part (a) and closure properties of regular languages to prove that the language $M = \{a^n b^k : n, k \in \mathbb{N}, n > k\}$ is not regular.