Directions: You may work to solve these problems in groups, but all written work must be your own. **Show your work**; See "Guidelines and advice" on the course webpage for more information.

- 1. Let $\Sigma = \{0, 1\}$, let $A = \bigcup_{k=0}^{2} \Sigma^{k}$, and let $B = \bigcup_{k=0}^{4} \Sigma^{k}$.
 - (a) List the strings in A. What is |A|?
 - (b) What is |B|?
 - (c) Recall that $AB = \{xy \mid x \in A \text{ and } y \in B\}$. Describe the members of AB. What is |AB|?
- 2. Let $\Sigma = \{0, 1\}$ and let A be the language defined recursively as follows: (1) $\lambda \in A$ and $1 \in A$, (2) if $x \in A$ then $x0 \in A$, (3) if $x \in A$, then $x01 \in A$.
 - (a) True or False: $0 \in A$. Justify your answer.
 - (b) True or False: $011 \in A$. Justify your answer.
 - (c) Give a simple, non-recursive description of A.