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The answers must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in class. Any other source must be specified clearly.

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**1.** (25 points) Let  $L$  over  $\Sigma = \{1, 2, 3, a, b, c, -\}$  be the language of names where every name has to begin with a letter ( $a, b$ , or  $c$ ).

(a) Give a recursive definition for  $L$ .

(b) Give a regular set for  $L$ .

**2.** (75 points) Give a regular set for the following languages.

(a) The set of strings over  $\{1, 2, a, b, c\}$  that start with “ $a$ ” and end with “ $1$ ”. Strings can have a length of one or greater.

(b) The set of strings over  $\{1, 2, a, b, c\}$  that start and end with a number. Strings can have a length of one or greater.

(c) The set of strings over  $\{a, b, c\}$  in which all the  $a$ 's precede the  $b$ 's, which in turn precede the  $c$ 's. It is possible that there are no  $a$ 's, or  $b$ 's, or  $c$ 's or the string is empty.