提出期限 : 平成２２年 ５月 １０日

演習第二

1. Construct a regular grammar which generates precisely all binary numbers that are divisible by 16. Prove the correctness of your grammar.

2. Consider the following grammar:

   $\mathcal{G} = [\mathsf{T}, \mathsf{N}, \sigma, \mathsf{P}]$, where $\mathsf{T} = \{a, b, c\}$, $\mathsf{N} = \{\sigma, \alpha, \beta\}$ and
   $\mathsf{P} = \{\sigma \to abc, \sigma \to a\alpha bc, \alpha b \to b\alpha, \alpha c \to \beta bcc, b\beta \to \beta b, a\beta \to aa\alpha, a\beta \to aa\}$

   (1) Is $\mathcal{G}$ a regular grammar? Provide arguments justifying your answer.
   (2) Determine $\mathsf{L}(\mathcal{G})$.
   (3) Prove the correctness of the assertion you made in (2).

3. Provide a regular grammar $\mathcal{G}$ for the language

   $$L = \{w \in \{a, b\}^* \mid 4 \text{ divides } |w|\} ,$$

   and prove $\mathsf{L} = \mathsf{L}(\mathcal{G})$.