

1. Given the grammar $G = (\{S, H\}, \{b, c, d, e\}, \{S \rightarrow b^2Se \mid H, H \rightarrow cHd^2 \mid cd\}, S)$, find the generated language (+proof). - 25p

2. Find grammars that generate the following languages: - 25p each
 - A. $L_1 = \{x^n y^n \mid n \in \mathbb{N}\}$ + proof
 - B. $L_2 = \{a^n b^{2n} \mid n \in \mathbb{N}^*\}$ + proof
 - C. $L_3 = \{a^n b^m \mid n, m \in \mathbb{N}^*\}$ - **regular** grammar required + proof
 - D. $L_4 = \{x^{2n} \mid n \in \mathbb{N}\}$, $L_4' = \{x^{2n} \mid n \in \mathbb{N}^*\}$ - **regular** grammars required + proofs
 - E. \mathbb{N}
 - F. All arithmetic expressions containing a as operand, $+$ $*$ as operators and $()$.