
Ma2201/CS2022
Quiz 0100

# Foundations of C.S.

Spring, 2021

PRINT NAME: _____

$\mathcal{SIGN}$: _____

Consider the following languages on $\Sigma = \{a, b\}$ defined by the regular expressions.

$$
\begin{aligned}
L_1: &\quad (\lambda^* \cup a \cup b \cup a^3 \cup b^3)^* \\
L_2: &\quad \lambda \cup a \cup b \cup ((a \cup b)^3)^* \\
L_3: &\quad \lambda \cup (a \cup b) \cup (a^* \cup b^*)^3 \\
L_4: &\quad \lambda \cup (a \cup b) \cup (a^3 \cup b^3)^* \\
L_5: &\quad \lambda \cup (a \cup b) \cup (a^3)^* \cup (b^3)^*
\end{aligned}
$$

1. (**2 pts**) Find two numbers $i$ and $j$ with $L_i \subseteq L_j$ and $L_j \not\subseteq L_i$.

2. (**2 pts**) Find two numbers $n$ and $m$ with $L_n = L_m$.

3. (**2 pts**) List all $L_i$, if any, which contain only strings of finite length.

4. (**2 pts**) List all $L_i$, if any, which contain the string $a^3b^3a^3b^3$.

5. (**2 pts**) Pick any two distinct languages above and describe them set theoretically.