Problem 1

Suppose L is lower triangular invertible and I want to solve

$$LX = B. \tag{1}$$

where B is a n by n matrix. The straightforward substitution method is $O\left(n^3\right)$. Design a Strassen-style fast method that solves the linear system without forming L^{-1} first (to subsequently evaluate $X = L^{-1}B$).

Problem 2

Let $\epsilon > 0$ and let k be any integer. Prove that

$$\lim_{n \to \infty} \frac{n(\log n)^k}{n^{1+\epsilon}} = 0.$$