Homework 12

Readings: Section 9.1, 9.2

Problem 1: Sipser 9.13 Let $pad(s, l)$ be the function that adds enough copies of the symbol # to the end of the string s so that the length of the result is at least l. For any language A and function $f : \mathbb{N} \to \mathbb{N}$ define the language

$$pad(A, f(m)) = \{pad(s, f(m)) | \text{ where } s \in A, m \text{ is the length of } s\}.$$

Prove that if $A \in TIME(n^6)$ then $pad(A, n^2) \in TIME(n^3)$.

Problem 2: Sipser 9.14 Prove that, if $NEXPTIME \neq EXPTIME$ then $P \neq NP$.

Problem 3: Sipser 9.19 Define the **unique-sat** problem to be

$$USAT = \{\langle \phi \rangle | \phi \text{ is a Boolean formula that has a single satisfying assignment}\}.$$

Show that $USAT \in P^{SAT}$.