

NO NOTES, BOOKS, ELECTRONIC DEVICES, OR INTERPERSONAL COMMUNICATION ALLOWED. Submit each solution on a separate sheet of paper.

Problems

LO1. Complete the following problems.

- (a) Evaluate $(-24)^{10} \bmod 7$. Show steps.
- (b) For the Strassen-Solovay primality test, is $a = 5$ a witness or accomplice when $n = 9$? Show work and explain.

LO2. Complete the following problems.

- (a) Use the Master Theorem to determine the growth of $T(n)$ if it satisfies the recurrence $T(n) = 10T(n/3) + n^3$.
- (b) Use the substitution method to prove that, if $T(n)$ satisfies

$$T(n) = 4T(n/2) + 3n,$$

Then $T(n) = O(n^2)$. Hint: remember to state the inductive assumption.