CECS 528, Learning Outcome Assessment 2, Spring 2024, Dr. Ebert

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

Problems and Solutions

LO1. Complete the following problems.

(a) Evaluate $(-24)^{10} \mod 7$. Show steps.

$$(a) \text{ Evaluate } (-24) \text{ mod } 7. \text{ show steps.}$$

$$(-24)^{10} = (4)^{10} = (2^2)^{10} = 2^{20} \text{ mod } 7$$

$$2 = 8 = 1 \text{ mod } 7$$

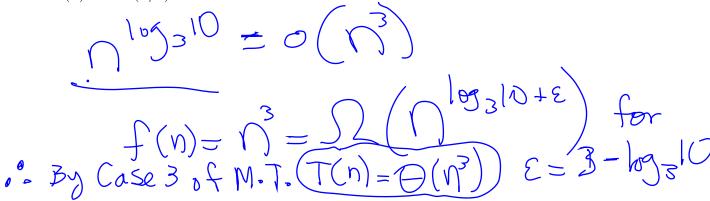
$$2 = 2^{20}$$

(b) For the Strassen-Solovay primality test, is a=5 a witness or accomplice when n=9? Show work and explain.

$$\left(\frac{5}{9}\right) = \left(\frac{9}{5}\right) = \left(\frac{4}{5}\right) = \left(\frac{2}{5}\right) = 1$$

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

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



(A)