Due Date: Thursday, October 20 at 5PM EDT

Carefully read and provide solutions to the problems below, showing all work required to justify any conclusions you make. You are encouraged to collaborate with your classmates, but all solutions turned in should be your own work. If you do collaborate, please record the names of those other students on your submitted work. Finally, your work should be submitted as a PDF on Gradescope before the listed due date.

Textbook problems: 18.1, 18.4(a), 20.3, 21.1, 21.5

Problem 1. (Lecture 7.2, Exercise 1) Suppose I send you the encrypted message $W^E = 265$, the modulus $N = 7519$ and the private key $D = 5$.

(a) What message did I send you? Remember to translate using the ASCII table in the notes.

(b) Can you break the code directly if I tell you one of the prime factors of N has only two digits?

Problem 2. Is 73 a quadratic residue mod 643?