

Fall 2020 CIS 3362 Quiz #4 Part A: Phi Function, Fermat, Euler Theorem, Discrete Log

Date: 10/26/2020

Directions: Please use your course notes and a calculator as aids for this exam. Do NOT attempt to look up information online. Even if you use a calculator, show each step of your calculations that you would do by hand. The role of the calculator will simply be to speed up individual calculations (13 x 29, for example), not to skip whole steps, as these steps are typically awarded points in the grading criteria.

Please either type your answers. The accepted file types for submission will be .doc, .docx, .txt and .pdf. I recommend that you directly type into the posted document to save time.

Please look at Webcourses to see when your due time and late due time are. It's recommended that you stop working at the due time and start uploading at that time. Anything turned in before the late due time will be accepted for full credit. Anything that doesn't make it in by the late due time will earn a 0. A 10 minute buffer will be provided after both due times. Please don't take advantage of these buffers as it's an unnecessary risk.

1) (5 pts) Determine $\phi(840)$. Please show your work.

2) (6 pts) Using Fermat's Theorem, determine the remainder when 75^{8235} is divided by 359. Note: 359 is a prime number. Please show your work. You may put in multiplications and mod simplifications in a calculator and just show the results.

3) (8 pts) Using Euler's Theorem, determine the remainder when 77^{6531} is divided by 1440. Please show your work. You may put in multiplications and mod simplifications in a calculator and just show the results.

4) (6 pts) If a and b are positive integers greater than 1, then \log_{ab} always has a defined value. However, this is not true for the discrete log problem. Give an example with prime $p = 7$, and integers a and b, with $1 < a, b < 7$, where the discrete log of b with the base of a, mod p has no defined value.