**Homework 3  
Fall 2021  
Due on Saturday December 18, 2021, 11:59 p.m. via Blackboard**

If you do not have the textbook, use the following link to download it

<https://emadalsuwat.github.io/cryptography/textbook1.pdf>

Do textbook problems:

* Problem 8.4 (Page 263)
* Problem 8.11 (Page 264)
* Problem 8.18 (Page 265)
* Determine the following:
  + Ø(49)
  + Ø(144)
* Find the order of x modulo n if
  + x = 5 and n = 7
  + x = 4 and n = 7
* How many primitive roots Modulo 11? Show your answer step by step.
* If you know that 3 is a primitive root modulo 17, find the other primitive roots modulo 17.
* Use Rabin–Miller primality test to show that 137 is prime?
* **(Graduate Students ONLY) answer the following 2 questions:** 
  + Use Fermat’s primality test to show that 7 is prime?
  + Use AKS primality test to show that 5 is prime?
* Problem 9.2 (a and c only) (Page 292)
* (**Optional**) Problem 9.3 (Page 293)