The University of Newcastle
School of Electrical Engineering and Computer Science

COMP3260/6360 Data Security

GAME 2

14th March 2019

Number of Questions: 5
Time allowed: 50min
Total mark: 5

In order to score marks you need to show all the workings and not just the end result.

	Student Number	***Student Name***
Student 1		
Student 2		
Student 3		
Student 4		
Student 5		
Student 6		
Student 7		

Question 1	***Question 2***	***Question 3***	***Question 4***	***Question 5***	***TOTAL***

1. Find the GCD of 1,496 and 1,989

2. Find the inverse of 3 modulo 101.

3. For the equation $\Phi(x) = y$, $y=1$ has two solutions: $x=1$ and $x=2$. Find all solutions for each of the following.

a. $y=2$
b. $y=8$
c. $y=29$

4. Calculate $\Phi(45)$.

5. Suppose there are 5 possible messages, A, B, C, D and E, with the probabilities p(A)= p(B)= 1/3,p(C)= 1/6, p(D)= p(E)= 1/12. What is the expected number of bits needed to encode these messages in optimal encoding? (That is, find H(M).) Provide optimal encoding. Calculate the average number of bits per message for your encoding.