Name:_____

Introduction to Cryptography
The Extended Euclidean Algorithm

(1) Write a function in Python which
   (a) accepts as arguments three integers a, b, and n;
   (b) prints an error message if there is no solution to the Diophantine equation $AX + BY = n$;
   (c) returns a list of the form $[X, Y, count, time]$ where the pair (X, Y) is a solution to the equation $AX + BY = n$, the third element is the number of iterations needed in the Euclidean algorithm, and the fourth element is the time taken to run the iterations.

(2) Use your function from the previous problem to solve the Diophantine equation $aX + bY = n$ for each set of integers below. Record a solution, computer run time and iteration count for each triple.
   (a) $a = 132595815297812611128 02, b = 1894225932825894444686, n = 35$
   (b) $a = 354224848179261915075, b = 573147844013817084101, n = 5$
   (c) $a = 573147844013817084101, b = 927372692143078999176, n = 21$

(3) Write a function in Python which
   (a) accepts as arguments two integers A and n;
   (b) returns the multiplicative inverse of $A \mod n$ if such a number exists, and returns FALSE otherwise.