Name: ECEN 227
ID: **Homework 7** November 5, 2019

1. Calculate the following:
   - $(99 \times (65) + 312) \bmod 7$
   - $(82 \times (55) + 44 \times (15)) \bmod 7$
   - $55^7 \bmod 3$
   - $79^{12} \bmod 6$
   - $2^{1000} \bmod 5$

2. Some numbers and their prime factorizations are given below.
   - $140 = 2^2 \times 5 \times 7$
   - $175 = 5^2 \times 7$
   - $532 = 2^2 \times 7 \times 19$
   - $648 = 2^3 \times 3^4$
   - $1078 = 2 \times 7^2 \times 11$
   - $1083 = 3 \times 19^2$
   - $15435 = 3^2 \times 5 \times 7^3$
   - $1078 = 2 \times 7^2 \times 11$
   - $25480 = 2^3 \times 5 \times 7^2 \times 13$

   Use these prime factorizations to compute the following quantities.

   (a) gcd(532, 15435)
   (b) gcd(648, 1083)
   (c) lcm(532, 1083)
   (d) lcm(1083, 15435)
   (e) lcm(648, 15435)
   (f) gcd(1078,140)
   (g) gcd(1078, 25480)
   (h) lcm(1078,140)
   (i) lcm(175, 25480)
   (j) lcm(140, 25480)

3. Suppose that the $O(\sqrt{N})$ algorithm for primality test is given the number 653117 as input. How many numbers would the algorithm have to check to either find a factor or determine that the input is prime? (653117 happens to be a prime number).