Applications of Modular Arithmetic

1. Reduce these numbers modulo 9 and modulo 11:

   (a) 200

   (b) 18000081

   (c) 9382

   (d) 65186

   Which ones were divisible by 11? Which ones were divisible by 9?

2. Show that a number a is divisible by 4 if and only if the last two digits of a are divisible by 4.

3. What numbers does the LCRNG $x_{n+1} = 2x_n + 1 \pmod{11}$ generate with seed $x_0 = 0$?

4. What number would be a bad seed to choose for the LCRNG in problem 3?