This is what I referred to in class as the “Mix-Em-Up random number generator.” The rationale for it is that a strategy of making random draws from a random set may give better independence properties to the generated sequence.

This generator will give a sequence $V_1, V_2, \ldots, V_L$ intended to be iid $U(0, 1)$. Here $L$ just denotes the length of the sequence to be generated. The “Mix-Em-Up” generator starts with a multiplicative congruential generator (MCG) that you design:

$$R_n = aR_{n-1} \pmod{m},$$

where $m$ and $a$ are chosen as described in Project 1.

Then do the following:

1. Form an array $A(1), A(2), \ldots, A(100)$ setting $A(k) = R_k/m$.

2. Set $n = 101$ and choose a random index $i = 1 + \text{(integer part}(R_n/m) \times 100\text{)}$.

   Then do the next three steps while $n \leq 100 + L$. Note that $n = 101$ on the first pass through this loop:

3. Output a new value for the sequence, $V = A(i)$.

4. Get a new random index $i$ by setting $i_{old} = i$ and new index $i = A(i_{old})$.

5. Then increment $n$ by 1 setting $n = n + 1$. Use the MCG to generate $R_n$ and refresh the array $A$ by assigning $A(i_{old}) = R_n/m$. 