

## Math 370

### Section 1.3: Solutions to Dynamical Systems

Theorem: The solution of the linear dynamical system  $a_{n+1} = ra_n$  for any nonzero constant  $r$  is

$$a_k = r^k a_0$$

where  $k = 0, 1, 2, 3, \dots$  and  $a_0$  is a given initial value.

Def: A number  $a$  is called an equilibrium value or fixed point of a dynamical system  $a_{n+1} = f(a_n)$  if  $a_k = a$  for all  $k = 1, 2, 3, \dots$  when  $a_0 = a$ . That is,  $a_k = a$  is a constant solution to the dynamical system.

Def: Systems that demonstrate sensitivity to the constant parameters of the system are called chaotic.