APÉNDICE XIII.- LA TEORÍA DEL CAOS: UN EJEMPLO[1844]

Ecuación no lineal de diferencia: $X_{n+1} = r[X_n(1 - X_n)]$. Condiciones iniciales r y $X_1 = 0.2$

	Convergencia en steady state	***Fluctuación de período dos***	***Fluctuación de período cuatro o período ocho***	***Fluctuación caótica o divergente***
$r = 0.1$ a $r = 0.9$	$X_{SS} \approx 0$			
$r = 1.0$				
$r = 1.1$ a $r = 1.9$	$X_{SS} = 0.0909$ a $X_{SS} = 0.4736$			
$r = 2.0$	$X_{SS} = 0.5$			
$r = 2.1$ a $r = 2.4$	$X_{SS} = 0.5238$ a $X_{SS} = 0.5833$			
$r = 2.5$	$X_{SS} = 0.6$			
$r = 2.6$	$X_{SS} = 0.61538$			
$r = 2.7$	$X_{SS} = 0.62963$			
$r = 2.8$	$X_{SS} = 0.642857$			
$r = 2.9$	$X_{SS} = 0.655172$			
$r = 2.95$	$X_{SS} = 0.661017$			
$r = 3.0$	$X_{SS} = 0.6663$			
$r = 3.03$		$X_{P1} = 0.607639$ $X_{P2} = 0.722394$		
$r = 3.1$		$X_{P1} = 0.558014$ $X_{P2} = 0.764567$		
$r = 3.2$		$X_{P1} = 0.513045$ $X_{P2} = 0.799455$		
$r = 3.3$		$X_{P1} = 0.479427$ $X_{P2} = 0.823603$		
$r = 3.4$		$X_{P1} = 0.451963$ $X_{P2} = 0.842154$		
$r = 3.46$			$X_{P1} = 0.838952$ $X_{P2} = 0.467485$ $X_{P3} = 0.861342$ $X_{P4} = 0.413234$	
$r = 3.53$			$X_{P1} = 0.821748$	

[1844] Ejercicio realizado por el autor con el programa *Mathematica* de Wolfram

			$X_{P2} = 0.517068$ $X_{P3} = 0.881472$ $X_{P4} = 0.368812$	
$r = 3.53$			$X_{P1} = 0.821748$ $X_{P2} = 0.517068$ $X_{P3} = 0.881472$ $X_{P4} = 0.368812$	
$r = 3.55$			$X_{P1} = 0.812656$ $X_{P2} = 0.540475$ $X_{P3} = 0.881684$ $X_{P4} = 0.370326$ $X_{P5} = 0.827805$ $X_{P6} = 0.506031$ $X_{P7} = 0.887371$ $X_{P8} = 0.354800$	
$r = 3.57$				$0.3427 \leq X_{CAOS} \leq 0.8924$
$r = 3.6$				$0.3245 \leq X_{CAOS} \leq 0.8986$
$r = 3.7$				$0.2567 \leq X_{CAOS} \leq 0.9250$
$r = 3.8$				$0.1805 \leq X_{CAOS} \leq 0.95$
$r = 3.9$				$0.1037 \leq X_{CAOS} \leq 0.9727$
$r = 4.0$				$0.00001 \leq X_{CAOS} \leq 0.999997$
$r \geq 4.1$				$Lim\, X_{DIVER} \rightarrow <<< 0$