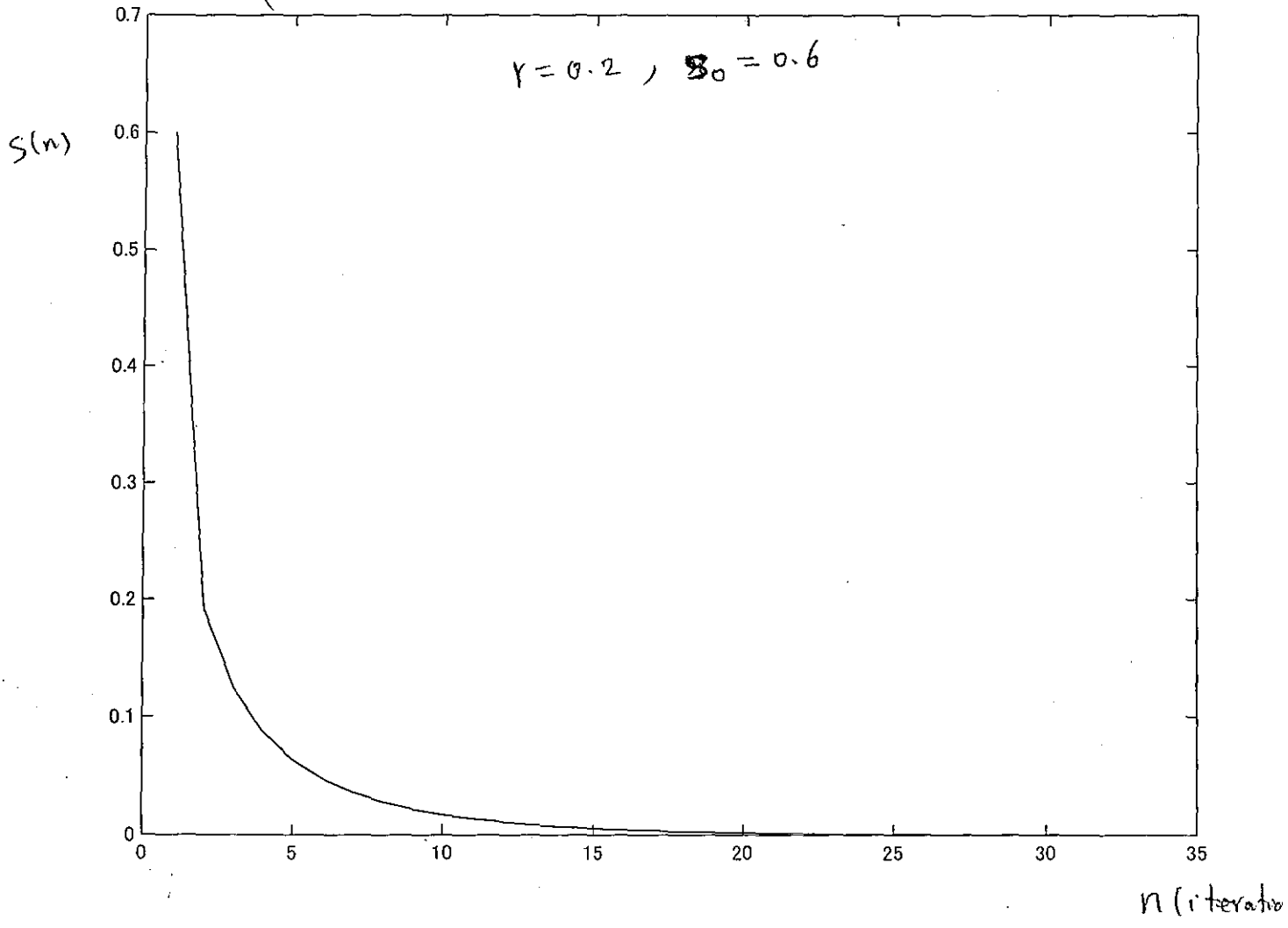
```
%chaos
clear all;
close all;
N=input('iteration number=');
s=zeros(1,N+1);
r=input('r=');
s(1)=input('s(1)=');

for n=1:N;
   s(n+1)=4*r*s(n)*(1-s(n));
 end
 plot(s);
 s(N)
```

Prog. chaos , by M.R. Asharif 2005/1/11

$$S(n+1) = 4r\,S(n)\,[1 - S(n)]$$

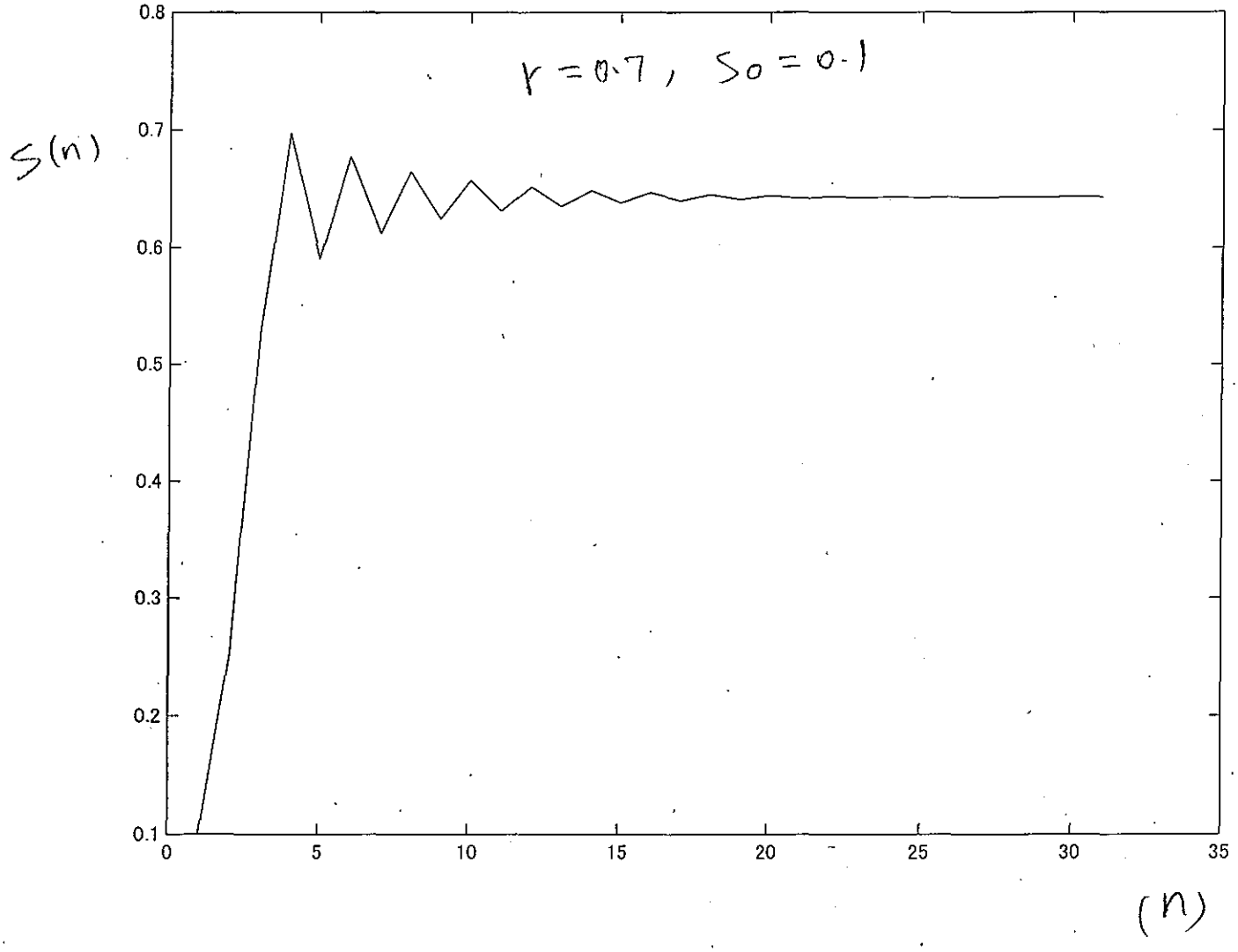
(period 1)



Prg. Chaos, by M.R. Ashraf 2005/1/11

$S(n+1) = 4rS(n)[1-S(n)]$

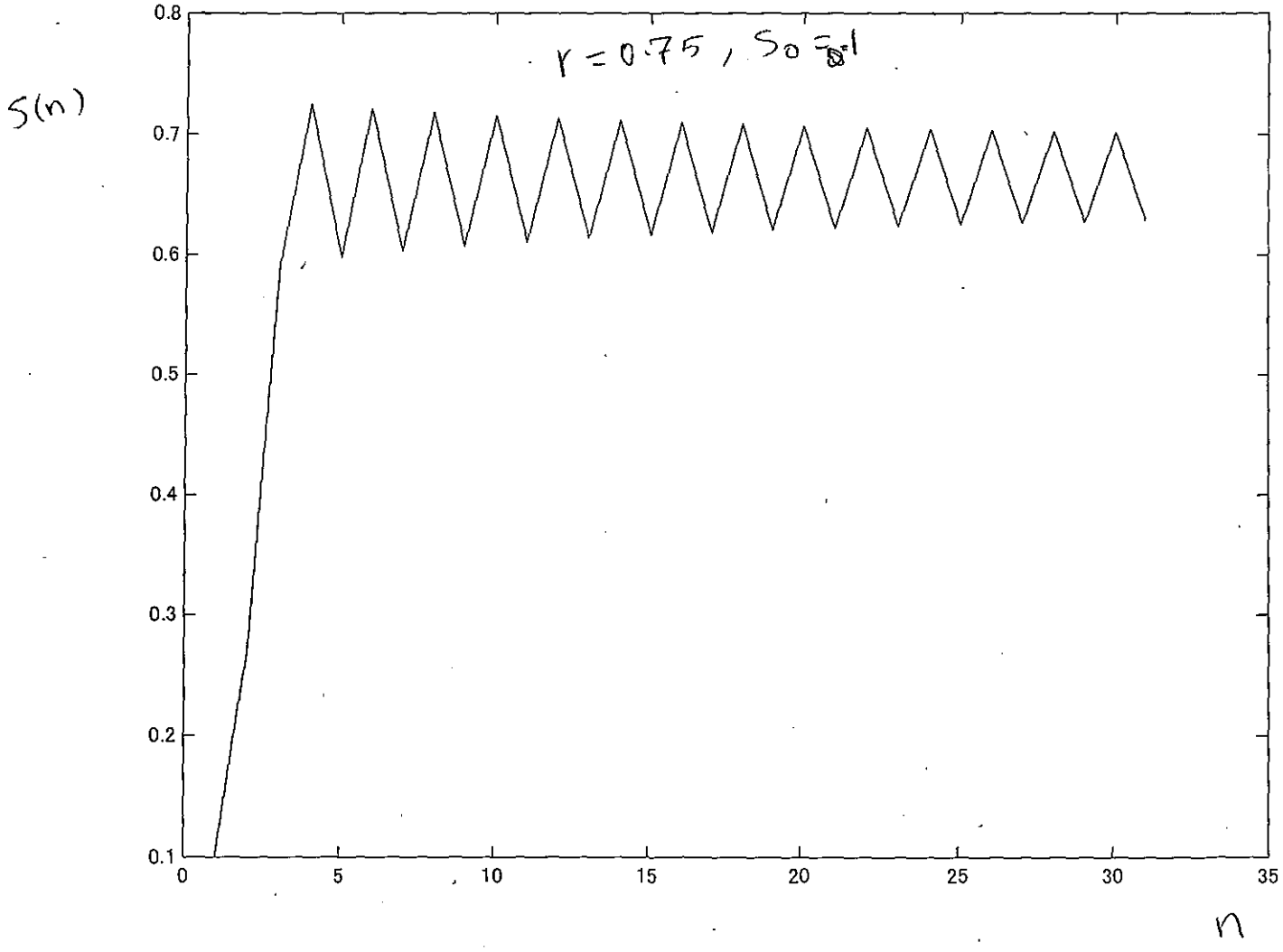
(period 1)



Prog. Chaos, by : M.R.Asharif 2005/1/12

$S(n+1) = 4r\,S(n)\,[1-S(n)]$

(Bifurcatation) period 2

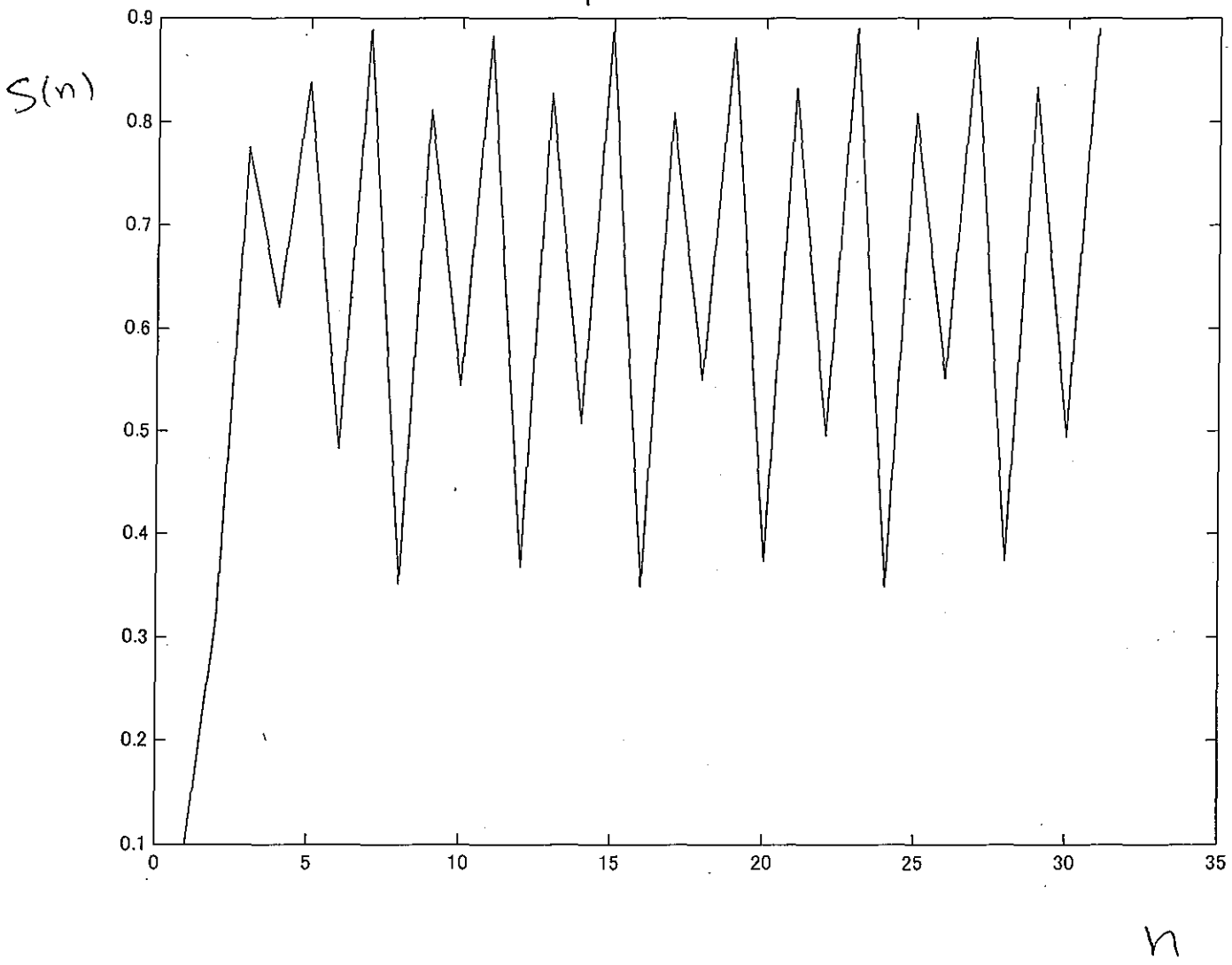


Prog. Chaos, by: M.R.Ashari 2005/1/12

$S(n+1) = 4r\,S(n)\,[1-S(n)]$

(period 4)

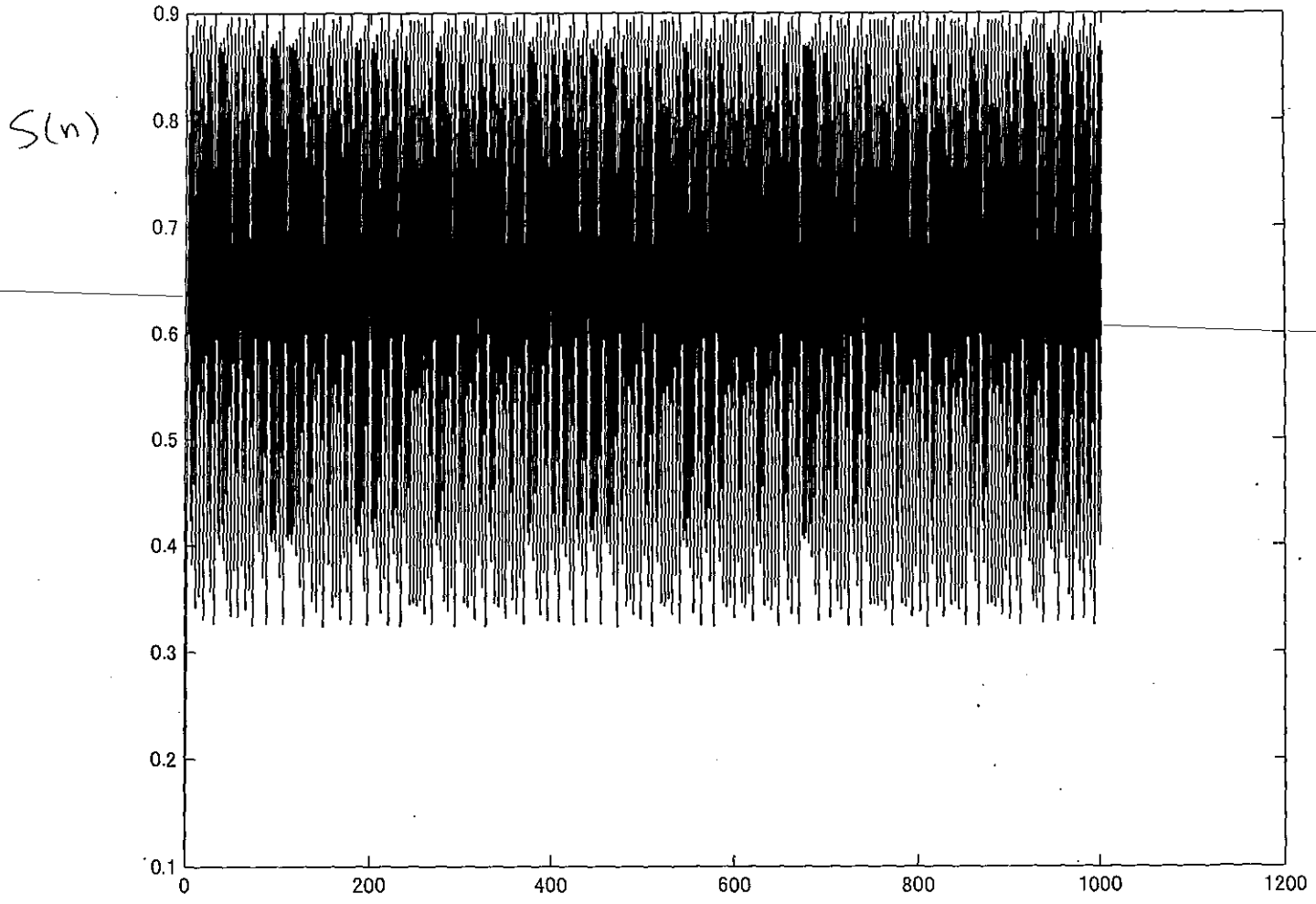
$r = 0.89$, $S_0 = 0.1$



Prog. Chaos , by: M.R.Asharif 2005/1/12

$$S(n+1) = 4rS(n)\left[1 - S(n)\right]$$

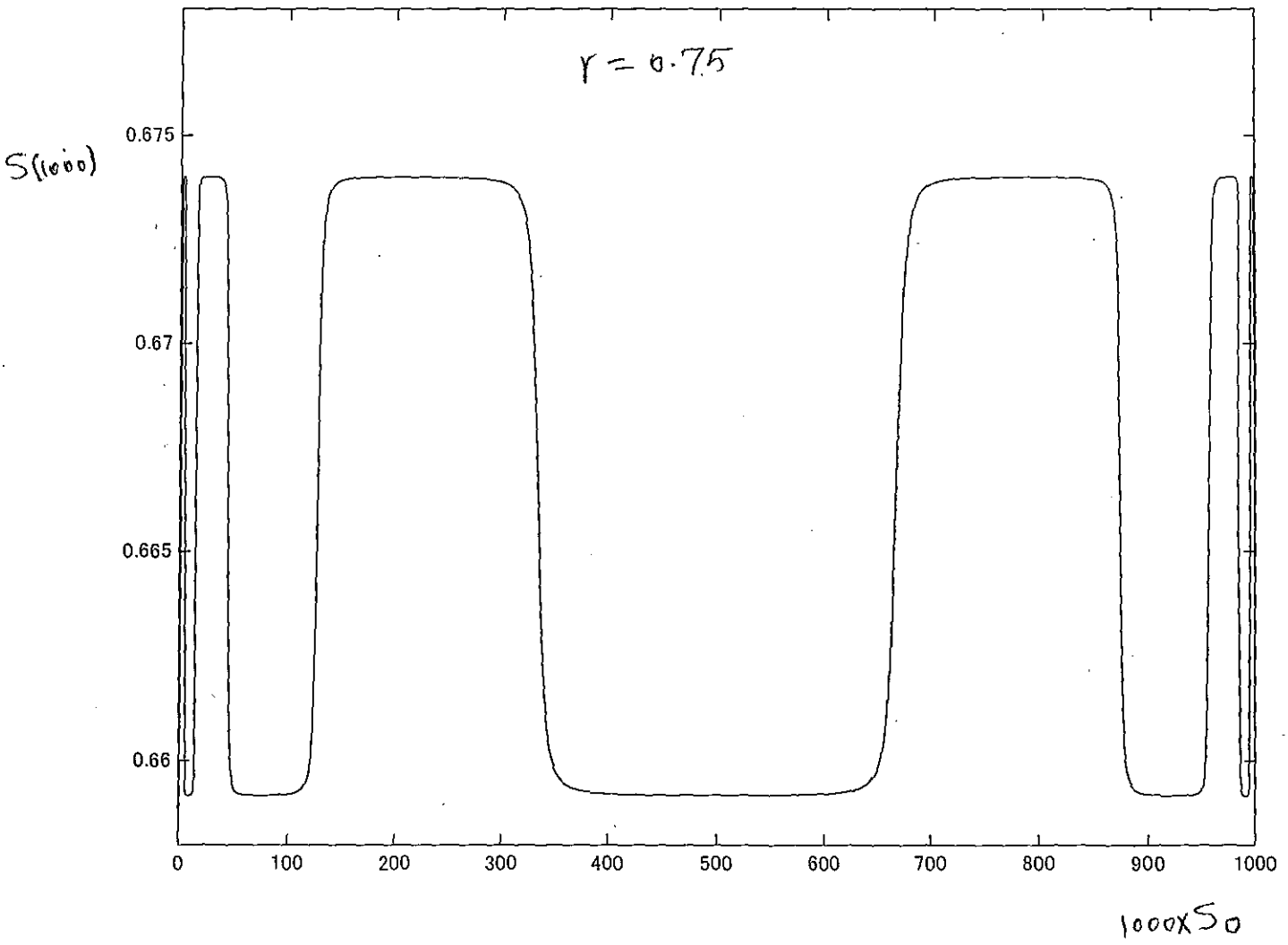
(Noise like) $r = 0.9$, $s = 0.1$



```
%chaos1
clear all;
close all;
N=input('iteration number=');
M=input('initial input number=');
s=zeros(1,N+1);
x=zeros(1,M);
r=input('r=');
%s(1)=input('s(1)=');
for i=1:M
   s(1)=i/(M+1);
      for n=1:N;
       s(n+1)=4*r*s(n)*(1-s(n));
      end
   x(i)=s(N+1);
end
%plot(s);
plot(x)
 %s(N)
```

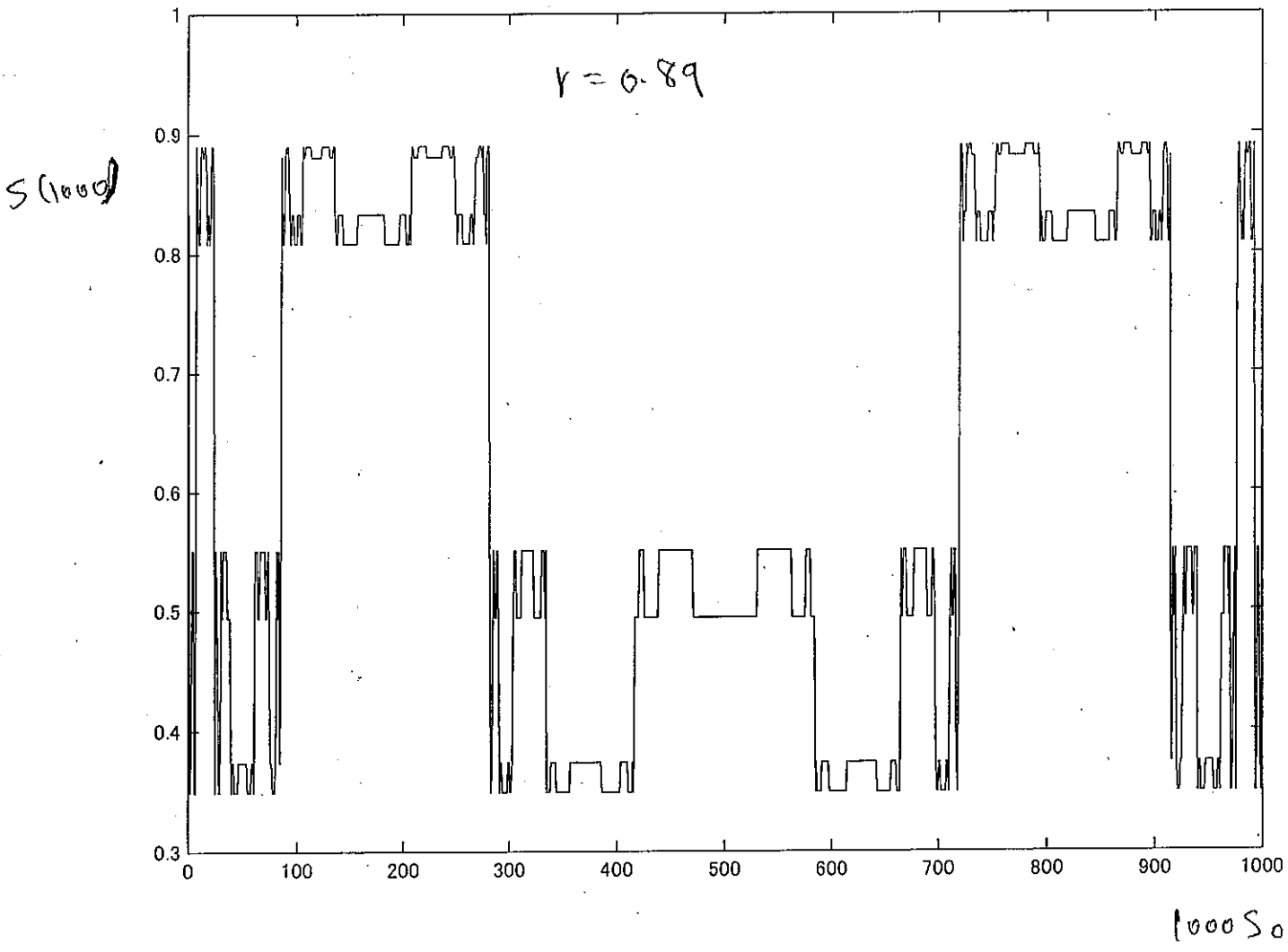
Prog. Chaos1 by: M.R.Ashrafi 2005/1/11

$$S(n+1) = 4r\,S(n)[1-S(n)]$$



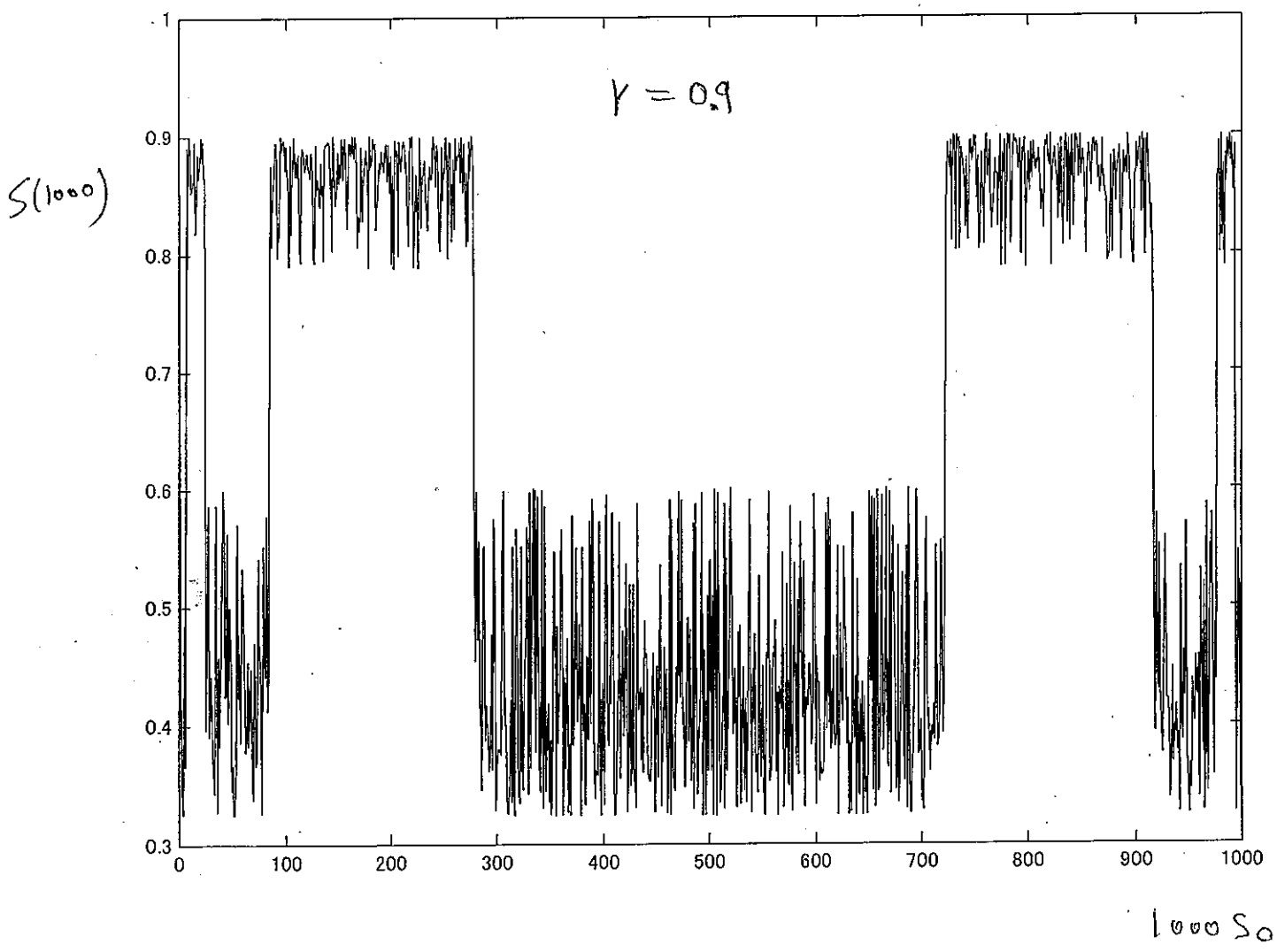
Prog. Chaos1 by: M.R. Ashrafi 2005/1/11

$S(n+1) = 4rS(n)[1-S(n)]$



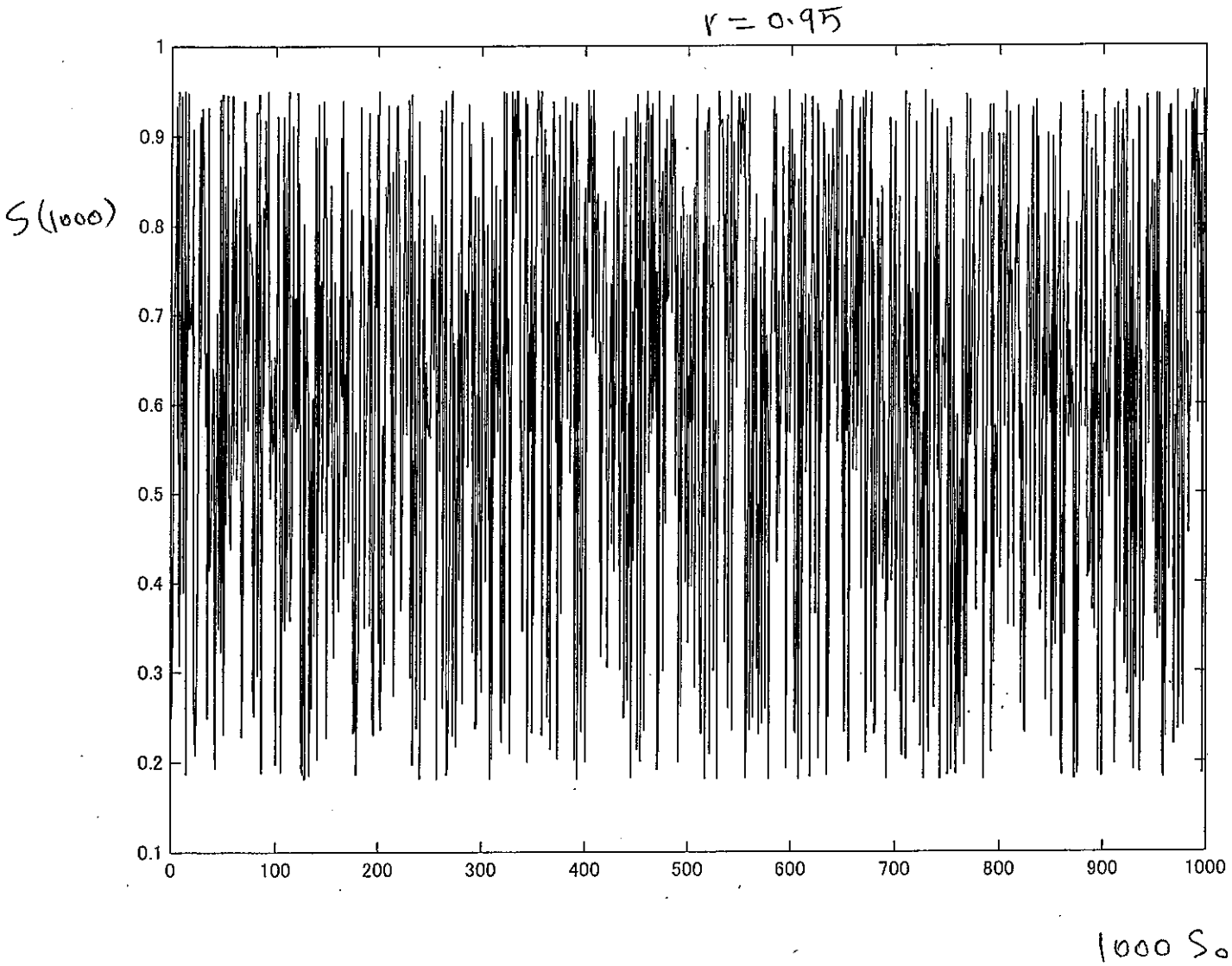
Prog. Chaos1 by: M.R.Ashaf 2005/1/11

$$S(n+1) = 4r\,S(n)\,[1 - S(n)]$$



Prog. Chaos1 by: M.R. Ashraf 2005/1/11

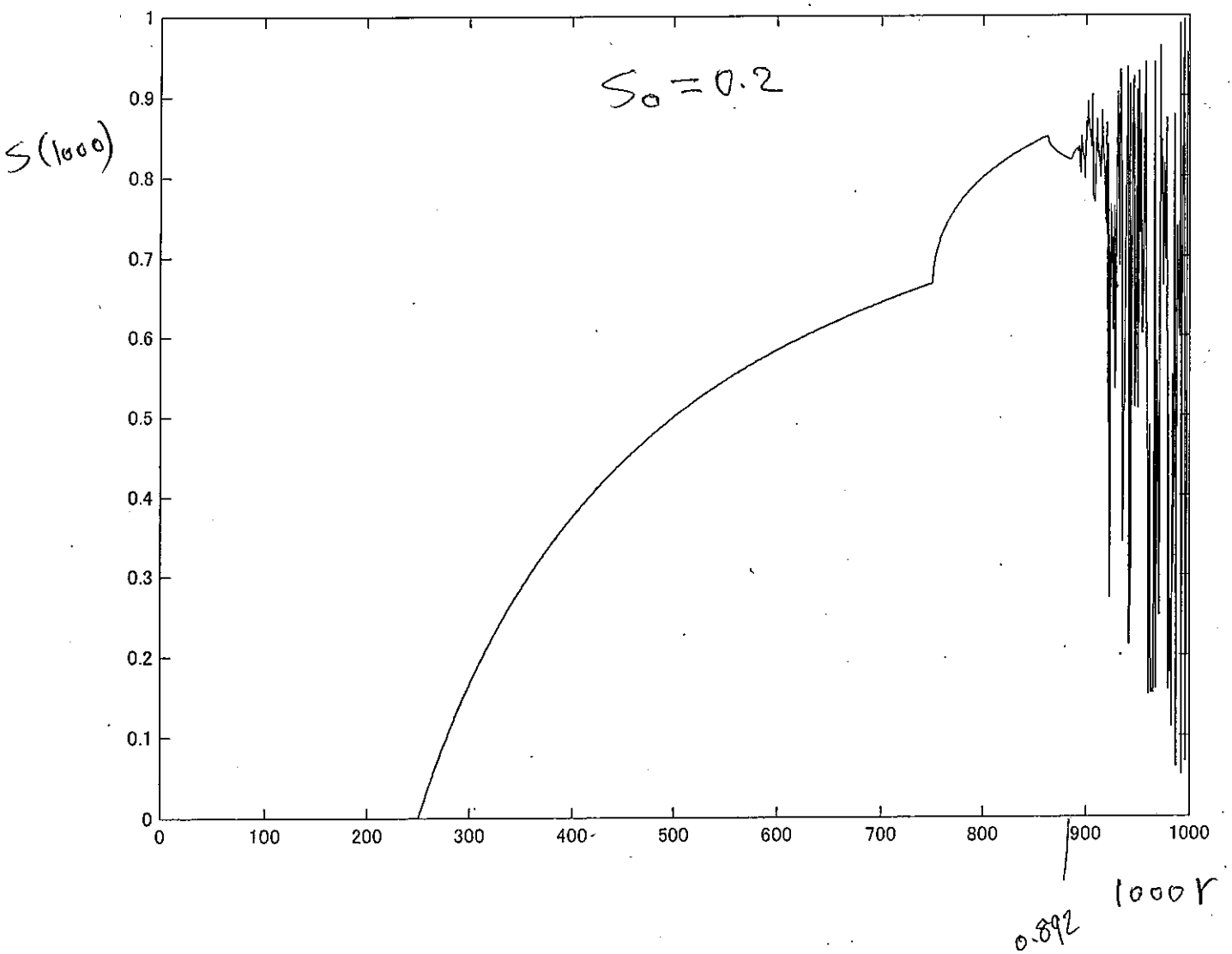
$S(n+1) = 4r\,S(n)\,[1-S(n)]$



```
%chaos2 (initial is constant and for various r)
clear all;
close all;
N=input('iteration number='); %typical value: 1000
M=input('r,s number=');       % typical value: 1000 or more
s=zeros(1,N+1);
x=zeros(1,M);
s(1)=input('s(1)=');          % typical value 0.6 or 0.7, less than 1
for i=1:M
   r=i/(M+1);
      for n=1:N;
       s(n+1)=4*r*s(n)*(1-s(n));
      end
   x(i)=s(N+1);
end
%plot(s);
plot(x)
 %s(N)
```

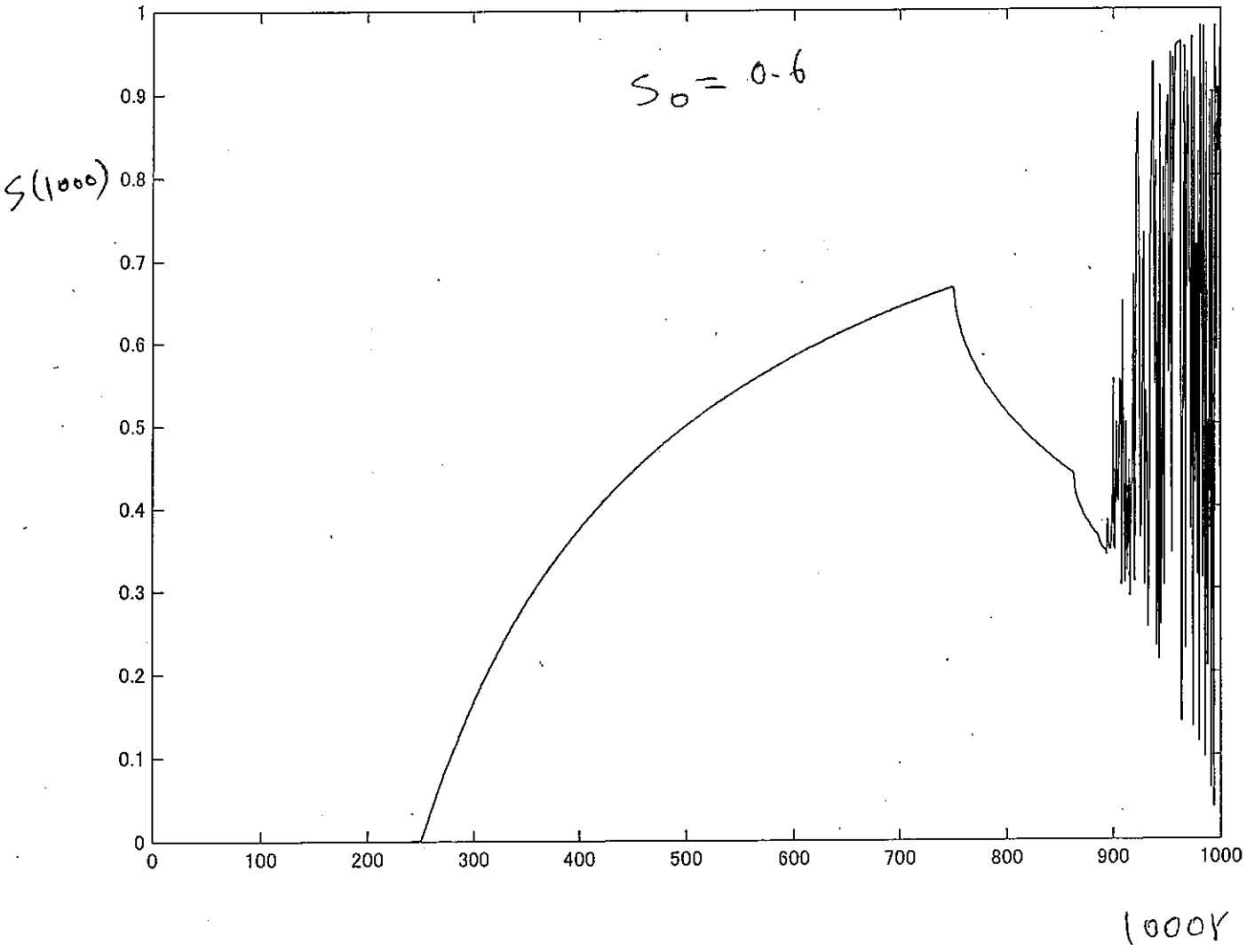
Prog. chaos 2. by: M.R. Ashari 2005/1/11

$$S(n+1) = 4r\,S(n)\,[1 - S(n)]$$



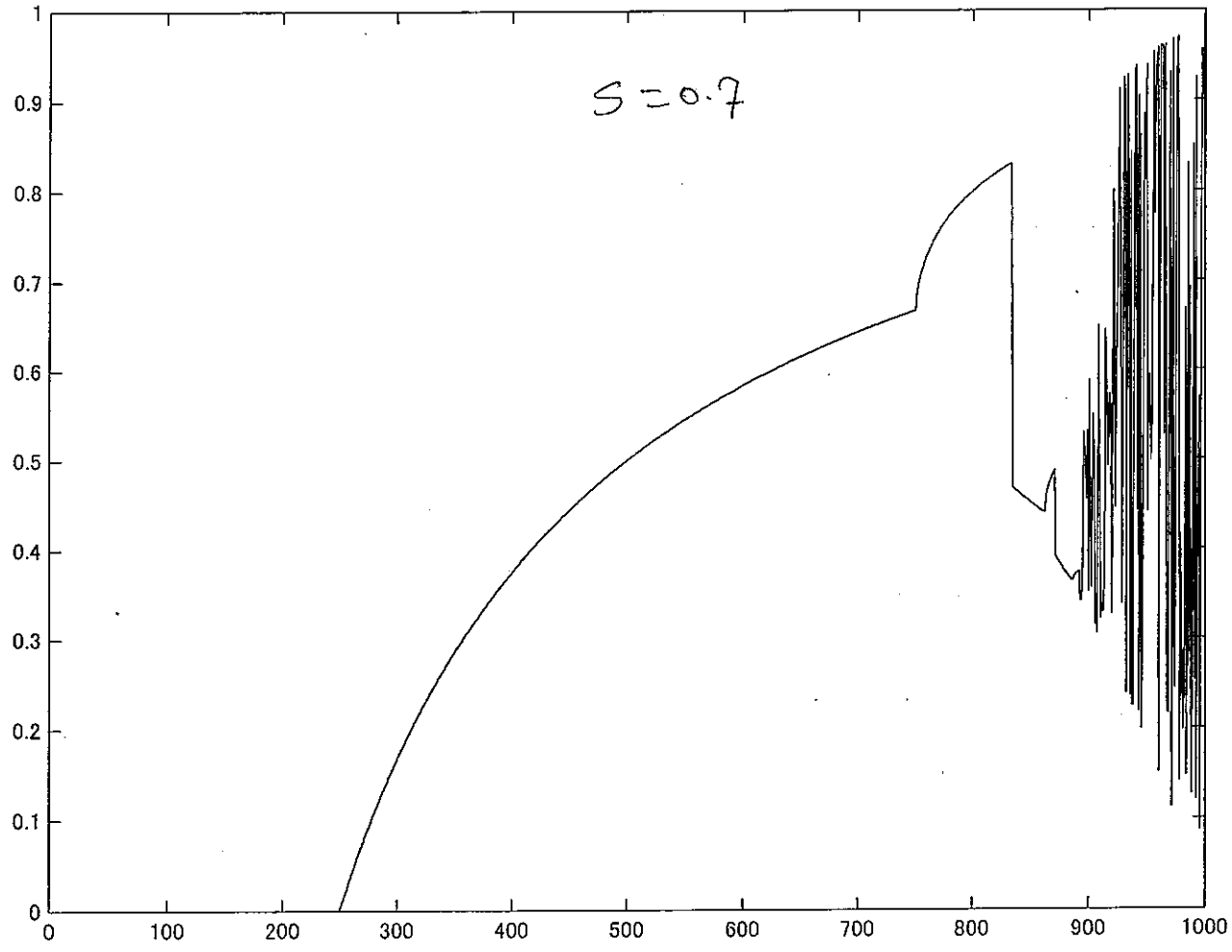
Prog. Chaos2 by: M.R. Ashani 2005/1/11

$$S(n+1) = 4r\,S(n)\,[1-S(n)]$$



Prog. chaos2 by: M.R.Asharif 2005/1/11

$$S(n+1) = 4rS(n)\left[1 - S(n)\right]$$



$S(n+1) = 4r\,S(n)(1-S(n))$

$r = 0.2$
$S = 0.6$

$r = 0.7$
$S = 0.1$
Converge to 0.6430