

Larry vo  
okay

H.W 20

1.

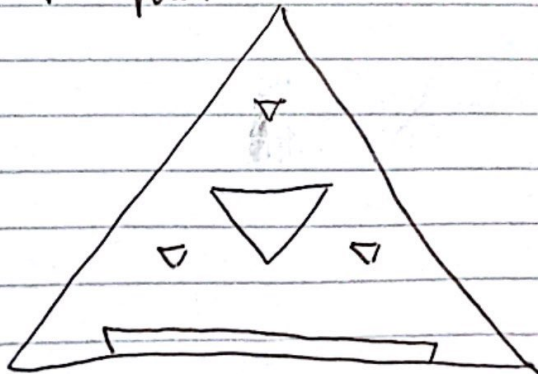
```
      1
     1 1
    1 2 1
   1 3 3 1
  1 4 6 4 1
 1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
```

mod 2

```
      1
     1 1
    1 0 1
   1 1 1 1
  1 0 0 0 1
 1 1 0 0 1 1
1 0 1 0 1 0 1
1 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0 1
```

Its a fractal because it has an inverted equilateral triangle in it.

The fractal diagram looks like this up to the 9<sup>th</sup> row.



2.  $x_{n+1} = a x_n (1 - x_n)$   
 $x_0 = .5$

I.  $a = 1$

for the first 10 terms it goes to about .0695  
but as you go higher the term gets closer  
to zero so I think it goes to zero.

II).  $a = 2.5$

It converges to about .59995

III).  $a = 3.1$

has a period of 2 and goes between  
about .765531 and about .55643

IV  $a = 3.5$

has a period of 4 and goes between  
about .38282, .8269, .50088, and .8749973

③

3. The feigenbaum constant is a Bifurcation parameter when  $f(x) = ax(1-x)$  changes periods in powers of 2.