Iterates of the logistic map y = f(x) = r*(1-x)*x; 0 < r < 4;
for various values of r. Note that
f is a polynomial of degree 2 = 2^1.
f2 is a polynomial of degree 4 = 2^2.
f3 is a polynomial of degree 8 = 2^3.

quad_f2.pdf
The pictures in this file illustrate the behavior of the second
iterate of the logistic map, f2(x) = f(f(x)),
as r grows from 0 to 4.

quad_f3.pdf
The pictures in this file illustrate the behavior of the third
iterate of the logistic map, f3(x) = f(f(f(x))),
as r grows from 0 to 4.

SelfSimQuad.pdf
The pictures in this file illustrate the approx. self-similarity
of f2 = f(f(x) as r grows. It does so by showing the behavior of
y2 = f2(x) for 2 < r < r0,
and the region   1/r < x < 1-1/r,
where the y2 takes values   1/r < y2 < 1-1/r.
Here the map reproduces the behavior of y = f(x) for 0 < r < 4
(reversed).
Of course, then the second iterate of f2 (i.e.: f4) also has a
region reproducing the behavior of y = f(x), and so on. This
self-similarity is what is behind the geometric nature of the
period-2 doubling cascade, characterized by the "universal"
Feigenbaum numbers.

Notes:
r = 2 and r = r0 = 3.6785735... are the boundaries of the region
where y2(1/2) >= 1/r.
The boundaries are the real solutions of the equation y2(1/2) = 1/r.
This yields a 4-th order polynomial equation, with one trivial real
solution (r=2). The other real solution is r0.

The range 2 < r < r0 includes the full period doubling and
chaotic limit region, but stops well before the period 6 window.

% -- %
% EOF