LogisticProject

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1 Logistic Map Bifurcation Diagram

The logistic difference equation is defined by the recursion

$$b_{n+1} = r * b_n(1 - b_n)$$

where b_n is the number of bunnies at time n. Starting with $b_0 = .25$, by around 400 iterations this will reach a steady state. This steady state (or steady periodic state) is dependent on r. Write a function which solves for the steady state(s) for each given r, and plot every state in the steady attractor for each r (x-axis is r, y=value seen in the attractor) using PyPlot. Take $r \in (2.9, 4)$

Optimize this function.

1.1 Old Solution

Please try solving this yourself first! Use this one as a hint if you get stuck.

In [ ]:
```
## Produces the logstic plot
# Requires PyPlot

function logisticPlot()
  tic()
  r = 2.9:.00005:4; numAttract = 100;
  steady = ones(length(r),1)*.25;
  for i=1:400 ## Get to steady state
    @devec steady = r.*steady.*(1-steady);
  end
  x = zeros(length(steady),numAttract);
  x[:,1] = steady;
  @simd for i=2:numAttract ## Grab values at the attractor
    @inbounds @fastmath x[:,i] = r.*x[:,i-1].*(1-x[:,i-1]);
  end
  toc()
  fig = figure(figsize=(20,10));
  plot(collect(r),x,"b.",markersize=.06)
  savefig("plot.png",dpi=300);
end
using PyPlot
@time logisticPlot()
```