Instructions 1

You may use any course materials, videos, websites, calculators, etc. for this test. Just don't ask another person for the answers or s
answers with other people. Please do not post questions about the test on the forum. If you have questions, please send them via er
chaos@complexityexplorer.org. Thanks.

Question 2
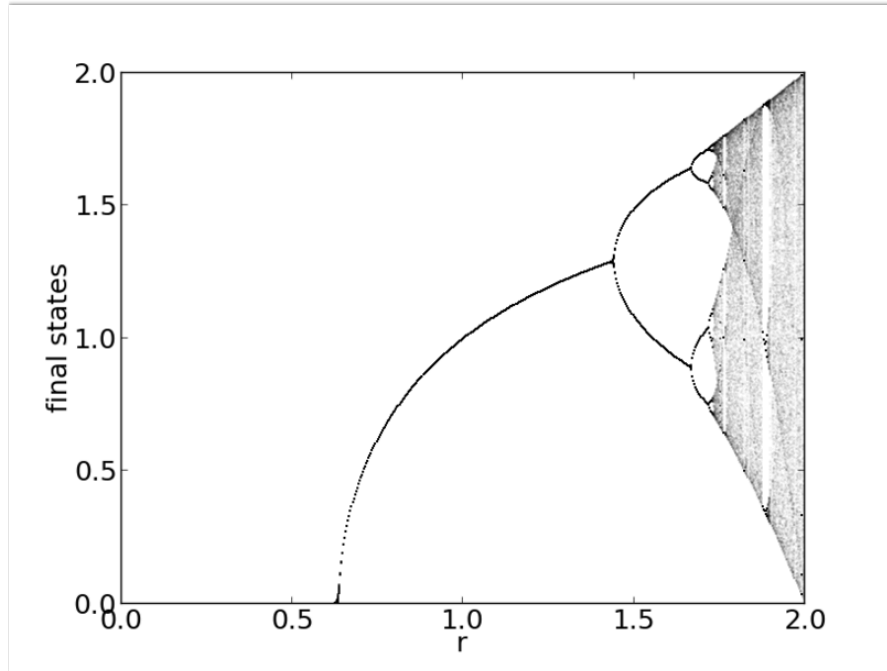
The bifurcation diagram for an iterated function (not the logistic equation) is shown in the figure above. Which statement best descri
long-term behavior of orbits of this dynamical system if r=1.0?

○ The orbit approaches zero

○ The orbit approaches a fixed point near x = 1.

○ The orbit approaches a fixed point near x = 1.3.

○ The orbit is periodic with period 2

○ The orbit appears to be aperiodic.

Question 3

The bifurcation diagram for an iterated function (not the logistic equation) is shown in Question 1. Which statement best describes th
behavior of orbits of this dynamical system if r=1.5?

○ The orbit approaches zero

○ The orbit approaches a fixed point near x= 1.

○ The orbit approaches a fixed point near x = 1.3.

○ The orbit is periodic with period two.

○ The orbit appears to be aperiodic.

Question 4

The bifurcation diagram for an iterated function (not the logistic equation) is shown in Question 1. Which statement best describes the behavior of orbits of this dynamical system if r=1.9?

○ The orbit approaches zero.

○ The orbit approaches a fixed point at x = 1.

○ The orbit approaches a fixed point near x = 1.3.

○ The orbit is periodic with period two.

○ The orbit appears to be aperiodic.

Question 5

Answer this question by using the web program that makes bifurcation diagrams for the logistic equation. Near r = 3.740 there is a window. A bifurcation from period 5 to period 10 occurs near what r value?

○ r = 3.738

○ r = 3.741

○ r = 3.743

○ r = 3.745

Question 6

Answer this question by using the web program that makes bifurcation diagrams for the logistic equation. Near r = 3.702 there is a window of what period?

○ 3

○ 4

○ 5

○ 6

○ 7

Question 7

Answer this question by using the web program that makes bifurcation diagrams for the logistic equation. Near r = 3.582 there is a window of what period?

○ 4

○ 5

○ 10

○ 12

○ 20

Question 8
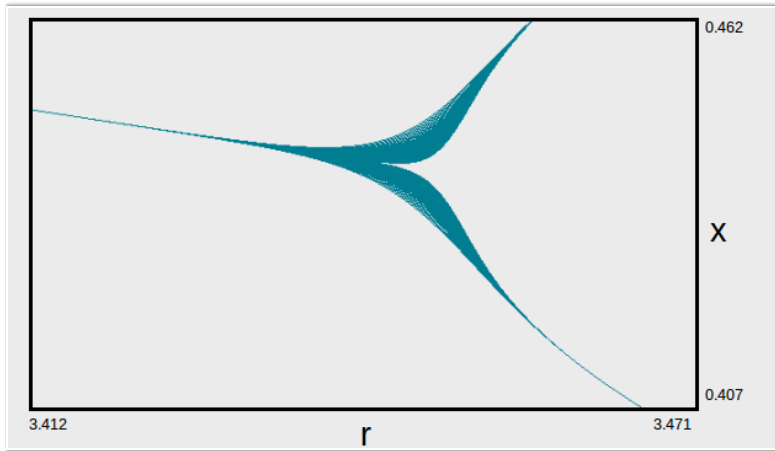
Near a bifurcation, the bifurcation diagram often becomes "fuzzy" or blurry, as shown above. (This is a zoomed-in view of the transit period two to period four.) What is the cause of this blurring?

- The program is not plotting enough points.
- The attractor is very weakly attracting, so it takes the orbit a very long time to reach the attractor.
- Sensitive dependence on initial conditions.
- The shadowing lemma

Question 9

Near a bifurcation, the bifurcation diagram often becomes "fuzzy" or blurry, as shown above. (This is a zoomed-in view of the transit period two to period four.) To make the bifurcation diagram appear sharper, what should one do?

- Make the program plot more iterates
- Make the program skip more iterates before it starts plotting.