Nonlinear Dynamics: Mathematical and Computational Approaches

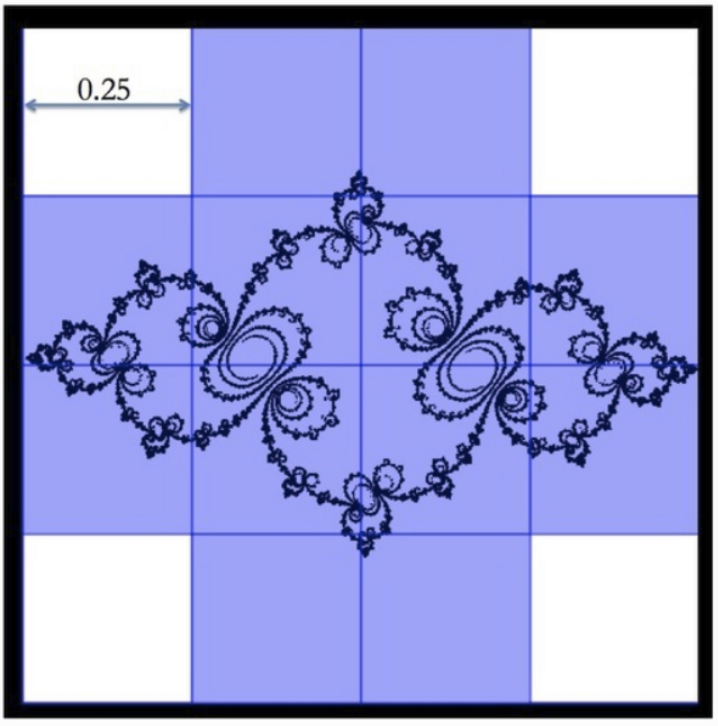
Lead instructor: Liz Bradley

Quiz scores are NOT recorded.

- You may come back to quizzes and take them as many times as you like
- When you are finished, clicking the "Score" button at the bottom of the test will show you the correct responses.

Question 1

Consider the following figure.



(a)

In the capacity dimension calculation for the set in the above figure, what is ϵ?

- A. 4
- B. 12
- ✔ C. 0.25
- D. $(0.25)^2$

(b)

In the capacity dimension calculation for the set in the above figure, what is $N(\epsilon)$?

- A. 4
- ✔ B. 12
- C. 0.25
- D. $(0.25)^2$

Question 2

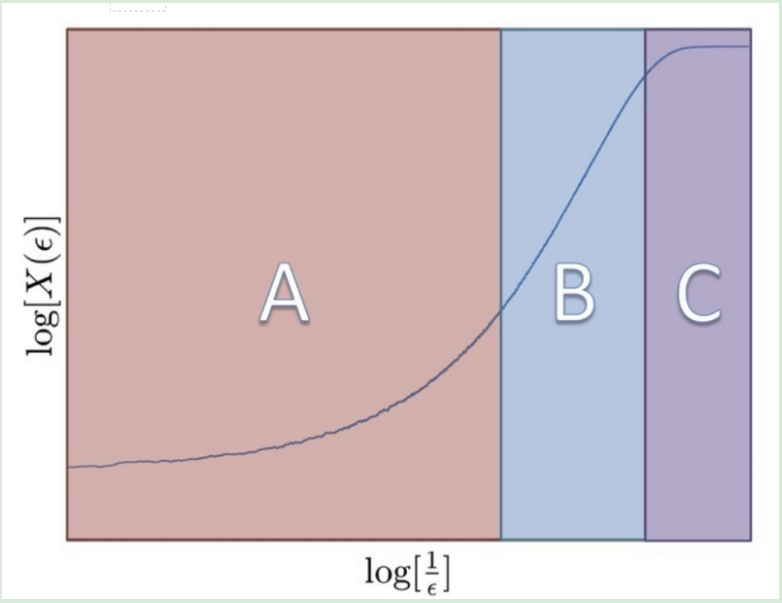


Figure 1

Consider the power law $X(\epsilon) \propto (1/\epsilon)^{\nu}$, which holds in the scaling region of a curve (if one exists). How would you approximate ν from the curve in Figure 1?

- A. The *y*-intercept of a line fitted to the curve in region B.
- ✔ B. The slope of a line fitted to the curve in region B.
- C. The lowest value of $X(\epsilon)$ where the curve flattens out (i.e., near the boundary between B and C).
- D. The lowest value of $X(\epsilon)$ where the curve becomes a line (i.e., near the boundary between A and B).

Question 3

Consider Figure 1. On this type of plot, region B is called ...

- ✔ A. A scaling region.
- B. A numerical side effect.
- C. A power law.
- D. A fractal dimension.

Question 4

Assume the curve in the plot in Figure 1 was generated with the box-counting algorithm from the lecture with ϵ ranging between 0.0001 and 5, and assume that the set has diameter 1.

(a)

The shape of the curve in Figure 1 region A is due to ...

- A. The power law relationship.
- B. Each point being covered by a single ϵ-ball.
- ✔ C. The entire set being covered by a single ϵ-ball.

(b)

The shape of the curve in Figure 1 region C is due to ...

- A. The power law relationship.
- ✔ B. Each point being covered by a single ϵ-ball.
- C. The entire set being covered by a single ϵ-ball.

(c)

The shape of the curve in Figure 1 region B is due to ...

- ✔ A. The power law relationship.
- B. Each point being covered by a single ϵ-ball.
- C. The entire set being covered by a single ϵ-ball.

You got 7 out of 7 questions correct Reset