Assignment 4

The due date for submitting this assignment has passed.
As per our records, you have not submitted this assignment.

1) The baker's map \( B \) of the square \( 0 \leq x \leq 1, 0 \leq y \leq 1 \) to itself is given by

\[
(x_n, y_n) = \begin{cases} 
(x_{n-1}, y_{n-1}) & \text{for } 0 \leq x_n < \frac{1}{2} \\
(x_n - 1, y_n + \frac{1}{2}) & \text{for } \frac{1}{2} \leq x_n \leq 1
\end{cases}
\]

where \( n \) is a parameter in the range \( 0 < n \leq 1/2 \).

For what values of \( n \) is the baker

- 1/4
- 1/2
- 1

No, the answer is incorrect.
Score: 0
Accepted Answers: None

2) The box dimension of the attractor for the baker map with \( n = 1/2 \)

- 0
- 1/2
- 1
- 2

No, the answer is incorrect.
Score: 0
Accepted Answers: None

3) Consider the dynamics of the baker's map in the case \( n = \frac{1}{2} \). Given that \( (x, y) = (a_1, a_2, a_3, \ldots, b_1, b_2, b_3, \ldots) \) is the binary representation of an arbitrary point in the square, write down the binary representation of \( B(x, y) \):

- \( B(x, y) = (a_1, a_2, a_3, \ldots, b_1, b_2, b_3, \ldots) \)
- \( B(x, y) = (a_1, a_2, a_3, \ldots, b_1, b_2, b_3, \ldots) \)
- \( B(x, y) = (a_1, a_2, a_3, \ldots, b_1, b_2, b_3, \ldots) \)
- \( B(x, y) = (a_1, a_2, a_3, \ldots, b_1, b_2, b_3, \ldots) \)

No, the answer is incorrect.
Score: 0
Accepted Answers: None

4) With the above notation (see Q. 3), which of the following would give rise to a periodic orbit of \( B \) with prime period 2?

- \((x, y) = (0.101010\ldots, 0.01010\ldots)\)
- \((x, y) = (0.01010\ldots, 0.10101\ldots)\)
- \((x, y) = (0.10101\ldots, 0.01010\ldots)\)
- \((x, y) = (0.01010\ldots, 0.10101\ldots)\)

No, the answer is incorrect.
Score: 0
Accepted Answers: None

5) Which of the Hamiltonian functions below would have the evolution

\[ q = p, \quad p = q + q^2. \]

- \( H(q, p) = p^2/2 + x \)
- \( H(q, p) = q^2 + p^3/3 \)
- \( H(q, p) = p^2/2 - q^2/2 - q^3/3 \)
- \( H(q, p) = q + p \)

No, the answer is incorrect.
Score: 0
Accepted Answers: None

6) If a two-degrees of freedom system is integrable, then which of the following statements are true?

- In the 2-dimensional phase space there are 1-dimensional torus on the 2-dimensional energy shell
- In the 2-dimensional phase space there are 1-dimensional torus on the 2-dimensional energy shell
- In the 4-dimensional phase space there are 3-dimensional torus on the 4-dimensional energy shell
- In the 4-dimensional phase space there are 3-dimensional torus on the 4-dimensional energy shell

No, the answer is incorrect.
Score: 0
Accepted Answers: None