Fractals and Scaling (2020)

5.8 Test » Test for Unit 5

Instructions 1

You may use any course materials, websites, calculators, etc. for this test. Just don't ask another person for the answers or share your with other people. If you have questions about the test, please send them to us via email.

Question 2

Suppose a quantity is distributed according to a power-law of the following form: $p(x) = Ax^{-2.5}$. What is the form for the cumulative di function P(x)?

- A. $P(x) = Cx^{-1.5}$
- B. $P(x) = Cx^{-2}$
- C. $P(x) = Cx^{-2.5}$
- D. $P(x) = Cx^{-3.5}$

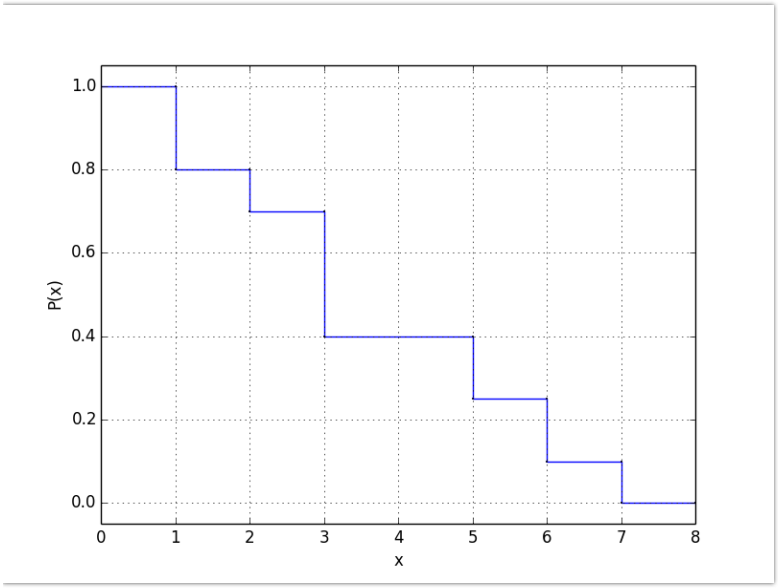
Question 3

Suppose you have a set of data that you believe to be distributed according to a power law: $p(x) = Ax^{-\alpha}$.
What is approach you should use to get the most accurate estimate of the exponent alpha?

- A. Use a histogram to estimate p(x), make a plot of log p(x) versus log x, and find the best linear fit to the data.
- B. Plot the cumulative distribution function P(x), make a plot of log P(x) versus log x, and find the best linear fit to the data.
- C. Use the maximum likelihood estimator to determine alpha.

Question 4

Shown in the figure is the cumulative distribution function P(x) for a variable x.



What fraction of the data is equal to or greater than 3?

- A. 0.1
- B. 0.4
- C. 0.7
- D. 1.0

Question 5

Referring again to the plot of the cumultative distribution function shown in Question 3, what fraction of the data are **less than** 4

- A. 0.0
- B. 0.4
- C. 0.6
- D. 1.0

Question 6

Referring again to the plot of the cumultative distribution function shown in Question 3, what fraction of the data are greater than 8?

- A. 0.0
- B. 0.4
- C. 0.6
- D. 1.0

Question 7

Suppose you have the following set of data: 5, 8, 10, 10, 12, 18, 23, 24, 29, 42. Let P(x) denote the cumulative distribution function that d these data. What is P(20)?

- A. 0.4
- B. 0.5
- C. 0.6
- D. Undefined

Question 8

Suppose again you have the following set of data: 5, 8, 10, 10, 12, 18, 23, 24, 29, 42. Let P(x) denote the cumulative distribution function describes these data. What is P(6)?

- A. 0.0
- B. 0.1
- C. 0.8
- D. 0.9

Question 9

Suppose again you have the following set of data: 5, 8, 10, 10, 12, 18, 23, 24, 29, 42. Let P(x) denote the cumulative distribution function describes these data. What is P(50)?

- A. 0.0
- B. 0.9
- C. 1.0
- D. Undefined