Chaotic motion is usually a consequence of

a. the laminar flow 叠层流cause by fluids.

> b. a self-similar or fractal pattern present in the phase space of the system of equations governing the problem.

c. the precise and deterministic dependence on initial conditions.

d. random motion caused with the equations of the system.

Discrete convolution can be computed very efficiently using the

a. slice theorem and the fast Fourier transform.

> b. convolution theorem and the fast Fourier transform.

c. fundamental theorem of arithmetic and the fast Fourier transform.

d. fundamental theorem of algebra and the fast Fourier transform.

The Fourier transform is best suited for data that is

a. random in nature.

> b. physical in nature.

c. constant in value.

d. very small in value.

A fractal pattern is a chaotic shape with no similarity, symmetry or structure.

True

* False

Which of following choices is NOT correct about the convolution:

a. Convolution could reduce the dimensionality of the input data

b. Convolution is a cross-correlation with kernel flipped

c. Convolution in time-domain is equivalent to multiplication in the Fourier domain

> d. Convolution is a sliding window operation with element-wise product

Which of the following is NOT one of the axioms that defines a group structure in abstract algebra?

> The set is closed under the operations of a product, its inverse and its division.

There must be an identity element in the set.

The set belonging to a group is either finite or infinite in size.

Elements of the set belonging to a group must be associative.

The Fourier transform is most analogous类似的 to

a. sound in the air propagating across long distances.

b. to the waves of the ocean.

> c. a prism splitting white visible light into different frequencies that we observe as a rainbow.

d. ripples propagating across the surface of a pond created by a stone falling in it.

Given the singular value decomposition A=UWVT as used in PCA, which of the following is correct?

a. The values in W encode the importance of the eigenvectors in VT but the ordering of these values is arbitrary.

> b. V contains the eigenvectors of the covariance matrix of A, U contains the eigenvectors of the covariance matrix of AT.

c. Without W, there is no way to determine the most important eigenvector in Vi

d. A is always the covariance matrix of the data matrix

The self-similarity of a pattern can be determined by measuring its Hausdorff dimension.

* True

False

An autoencoder is able to provide a compressed or compact form of the data by

a. always optimizing the convolutional representation of the data through the use of filters.

b. optimizing a structured representation of the data involving convolutions and filtering.

> c. optimizing the representation of the data through a information bottleneck that is the latent space.

d. optimizing a wavelet representation of the data and its mean value.

The PCA models the variation with respect to the median.

True

* False

A sigmoid layer has a learnable parameter and maps input values to output values between -1 and 1

True

* False

Which of following choices is correct about the image in Fourier transform domain:

> a. In the Fourier domain, the distance from a pixel to origin determines the frequency of the wave that it represents

b. In the Fourier domain, the amplitude of a pixel shows the phase of the wave which that pixel represents.

c. The high frequency components in Fourier domain represent contrast information of the image in image domain

d. The low frequency components in Fourier domain represent edge information of the image in image domain

Which of the following is the most correct description of an activation function in the context of an artificial neural network?

a. It determines the change required to weights and biases in order to get the desired output.

b. It computes the weighted sum of all the inputs to a neuron.

c. It evaluates how close we are to the desired output.

> d. It determines the firing of a neuron given the weighted sum of all the inputs to the neuron

Which of following choices is NOT correct about random forest and decision tree:

a. Decision tree is built on all features of the dataset and random forest only uses a subset of overall features

b. Both decision tree and random forest split data with most information gain

> c. Overfitting is more likely happened to random forest because of its randomness

d. Random forest built multiple “trees” and each of them could generate an output, while the decision tree only has a single “tree” with single output

The PCA will compute the dimensionality reduction of the data through the use of Eigen-composition

True

* False

What is the correct order of operations for an optimization with gradient descent?

a Update the network weights to minimize the loss.

b Calculate the difference between the predicted and target value.

c Iteratively repeat the procedure until convergence.

d Compute a forward pass.

e Initialize the neural network weights.

a. bcdea

> b. edbac

c. eadbc

d. ebadc