What is the definition of probability?

- a) The certainty of an event occurring
- b) A measure of the likelihood of an event
- c) The measure of the total number of possible outcomes
- d) A prediction of the outcome of an event

What is a sample space?

- a) The set of favorable outcomes
- b) The set of all possible outcomes
- c) The number of outcomes in an experiment
- d) A subset of outcomes

What is the sample space for rolling two dice?

- a) {1, 2, 3, 4, 5, 6}
- b) {(1,1), (1,2), (2,1), (2,2), ..., (6,6)}
- c) {2, 4, 6, 8, 10, 12}
- d) {(1,1), (1,2), (2,1), (2,2)}

What is the probability of drawing a yellow marble from a bag containing 3 red, 2 yellow, and 1 blue marble?

- a) 1/6
- b) 2/6
- c) 1/3
- d) 2/3

If you flip a fair coin, what is the probability of getting tails?

- a) 0
- b) 0.25
- c) 0.5
- d) 1

If two events A and B are independent, what is the probability of both A and B occurring?

- a) P(A) + P(B)
- b) P(A) × P(B)
- c) P(A) - P(B)
- d) P(A) / P(B)

What is the probability of rolling a 4 on a six-sided die and drawing a red card from a deck of cards?

- a) 1/6 × 1/2
- b) 1/6 × 26/52
- c) 1/6 + 26/52
- d) 1/6 × 1/13

What does P(A|B)P(A | B)P(A|B) represent?

- a) The probability of A given B
- b) The probability of A and B occurring together
- c) The probability of A occurring
- d) The probability of B occurring

If P(A)=0.4P(A) = 0.4P(A)=0.4 and P(A|B)=0.5P(A | B) = 0.5P(A|B)=0.5, what is P(A∩B)P(A \cap B)P(A∩B) given P(B)=0.8P(B) = 0.8P(B)=0.8?

- a) 0.2
- b) 0.4
- c) 0.32
- d) 0.5

What is the probability of drawing a queen or a heart from a standard deck of 52 cards?

- a) 4/52
- b) 16/52
- c) 17/52
- d) 13/52

If the probability of event A is 0.6 and event B is 0.7, what is the probability of either A or B occurring if A and B are mutually exclusive?

- a) 0.3
- b) 0.6
- c) 1.3
- d) 0.7

What does Bayes' Theorem help us calculate?

- a) The probability of an event occurring without any conditions
- b) The conditional probability of an event based on prior knowledge and new evidence
- c) The probability of two events occurring simultaneously
- d) The total probability of all possible outcomes

In Bayes' Theorem, what does P(A|B)P(A | B)P(A|B) represent?

- a) The prior probability of event A

- b) The probability of event B given event A
- c) The probability of event A given event B
- d) The joint probability of events A and B

What does P(B|A)P(B | A)P(B|A) represent in Bayes' Theorem?

- a) The probability of event A occurring
- b) The probability of event B occurring
- c) The probability of observing event B given that event A has occurred
- d) The prior probability of event B

To derive Bayes' Theorem, which basic probability concept is used?

- a) Addition rule
- b) Multiplication rule
- c) Conditional probability
- d) Law of Total Probability

If P(A)=0.4P(A) = 0.4P(A)=0.4, P(B|A)=0.5P(B | A) = 0.5P(B|A)=0.5, and P(B)=0.8P(B) = 0.8P(B)=0.8, what is P(A|B)P(A | B)P(A|B)?

- a) 0.25
- b) 0.30
- c) 0.40
- d) 0.50

Which of the following is NOT a typical application of Bayes' Theorem?

- a) Medical diagnosis
- b) Weather forecasting
- c) Linear regression
- d) Spam filtering

Which of the following is NOT a component of Bayes' Theorem?

- a) P(A|B)P(A | B)P(A|B)
- b) P(B|A)P(B | A)P(B|A)
- c) P(A∩B)P(A \cap B)P(A∩B)
- d) P(A)P(A)P(A)

What is a random variable?

- a) A function that assigns a real number to each possible outcome of a random experiment
- b) A measure of central tendency in statistics
- c) A method for calculating probabilities
- d) A fixed value used in probability calculations

Which of the following is an example of a random variable?

- a) The height of a person
- b) The total cost of a product
- c) The color of a car
- d) The day of the week

Which of the following is a characteristic of a discrete random variable?

- a) Takes on a continuous range of values
- b) Associated with a probability density function (PDF)
- c) Takes on a countable number of distinct values
- d) Represents measurements with infinite possibilities

What is associated with continuous random variables?

- a) Probability mass function (PMF)
- b) Probability density function (PDF)
- c) Probability distribution table
- d) Cumulative distribution function (CDF)

Which of the following is an example of a discrete random variable?

- a) The time taken for an event to occur
- b) The temperature at a given location
- c) The number of defective items in a batch
- d) The height of an individual

Which of the following is an example of a continuous random variable?

- a) The number of students in a class
- b) The number of cars passing a checkpoint
- c) The time it takes to complete a test
- d) The number of coins in a jar

What distinguishes discrete random variables from continuous random variables?

- a) Discrete random variables are measured, while continuous random variables are counted
- b) Discrete random variables can take on infinite values, while continuous random variables have a finite number of values
- c) Discrete random variables have a PMF, while continuous random variables have a PDF
- d) Continuous random variables have a PMF, while discrete random variables have a PDF

What notation is commonly used for both discrete and continuous random variables?

- a) Lowercase letters
- b) Numeric values

- c) Uppercase letters
- d) Symbols

What does a discrete probability distribution represent?

- a) The likelihood of outcomes in a continuous range
- b) The probability of different outcomes in a discrete set
- c) The expected value of a random variable
- d) The variance of a random variable

Which of the following is a common example of a discrete probability distribution?

- a) Normal distribution
- b) Poisson distribution
- c) Exponential distribution
- d) Uniform distribution

What is a Bernoulli distribution used to model?

- a) Outcomes with three possible results
- b) Outcomes with two possible results
- c) Outcomes in a continuous range
- d) Outcomes with multiple categories

In a Bernoulli trial, if the probability of success is denoted by ppp, what is the probability of failure?

- a) p
- b) 1
- c) 1−p
- d) p+1

Which scenario is best modeled by a binomial distribution?

- a) The number of defective items in a batch
- b) The height of a person
- c) The temperature at a given location
- d) The weight of an individual

In a binomial distribution, what does n represent?

- a) The number of successes
- b) The number of trials
- c) The probability of success
- d) The probability of failure

What distinguishes a hypergeometric distribution from a binomial distribution?

- a) The hypergeometric distribution does not assume replacement in trials
- b) The hypergeometric distribution assumes replacement in trials

- c) The binomial distribution considers only two outcomes
- d) The hypergeometric distribution models continuous outcomes

In a hypergeometric distribution, what does NNN represent?

- a) The number of trials
- b) The size of the population
- c) The number of successes
- d) The desired number of successes

What does a geometric distribution measure?

- a) The number of failures before a specified number of successes
- b) The probability of a single success
- c) The number of successes in a fixed number of trials
- d) The average number of occurrences in a given interval

In a geometric distribution, if p is the probability of success, what does kkk represent?

- a) The number of successes
- b) The number of failures before the first success
- c) The probability of failure
- d) The total number of trials

Which type of event is best modeled by a Poisson distribution?

- a) Events with fixed intervals of time or space
- b) Events with a fixed number of trials
- c) Events with two possible outcomes
- d) Events with continuous outcomes

In a Poisson distribution, what does λ represent?

- a) The number of trials
- b) The average number of occurrences in a fixed interval
- c) The probability of success
- d) The probability of failure

What is a multinomial distribution model?

- a) The probability of multiple successes in a fixed number of trials
- b) The probability of a single event in a fixed number of trials
- c) The probability of multiple outcomes with many possible results
- d) The number of failures before a specified number of successes

In a multinomial distribution, what does n represent?

- a) The number of trials
- b) The number of possible outcomes

- c) The probability of each outcome
- d) The total number of successes

What distinguishes continuous probability distributions from discrete ones?

- a) Continuous distributions use Probability Mass Functions (PMFs)
- b) Continuous distributions describe outcomes over an interval, not exact values
- c) Continuous distributions can only take on integer values
- d) Continuous distributions have a finite number of possible outcomes

Which function is used to define continuous probability distributions?

- a) Probability Mass Function (PMF)
- b) Probability Density Function (PDF)
- c) Cumulative Distribution Function (CDF)
- d) Likelihood Function

What is a continuous uniform distribution model?

- a) Random variables with equal probabilities within a range
- b) Random variables with varying probabilities based on a normal distribution
- c) Random variables whose logarithms follow a normal distribution
- d) Random variables with discrete values

Which of the following is a key property of the normal distribution?

- a) It has two parameters: mean and standard deviation
- b) It is defined by discrete outcomes
- c) It has a skewed shape
- d) It is used to model rare events

In a standard normal distribution, what are the mean μ and standard deviation σ?

- a) μ=0 and σ=1
- b) μ=1 and σ=0
- c) μ=1 and σ=1
- d) μ=0 and σ=0

What is the log-normal distribution used to model?

- a) Random variables whose logarithms follow a normal distribution
- b) Random variables with equal probability over an interval
- c) Random variables that follow a geometric distribution
- d) Random variables with a fixed number of possible outcomes

What does the PDF of a log-normal distribution depend on?

- a) Mean and variance of the normal distribution of ln⁡(X)\ln(X)ln(X)

- b) Mean and standard deviation of XXX
- c) The number of successes and trials
- d) The average rate of occurrence of an event

What happens to the Student's t distribution as the sample size increases?

- a) It approaches the normal distribution
- b) It becomes more skewed
- c) Its variance increases
- d) It becomes more discrete

In the chi-square distribution, what does the degrees of freedom ppp represent?

- a) The number of normal random variables squared
- b) The total number of events
- c) The number of trials conducted
- d) The number of observed values minus the number of expected value

In the exponential distribution, what does λ\lambdaλ represent?

- a) The rate parameter, or the inverse of the average time between events
- b) The mean of the distribution
- c) The variance of the distribution
- d) The probability of success

For a continuous random variable X, how is the expected value calculated?

- a) Using the variance formula
- b) Integrating the product of the variable and its PDF over the entire range
- c) Summing the values of X
- d) Calculating the median of X

For a continuous random variable X, how is the variance calculated?

- a) By integrating the squared differences between the variable and its expected value, weighted by the PDF
- b) By summing the values of X
- c) By finding the mean of the squared values
- d) By calculating the mode of X

What is the primary difference between expectation (expected value) and variance?

- a) Expectation measures the average value, while variance measures the spread around that value
- b) Expectation measures the spread around the mean, while variance measures the average value
- c) Expectation is used for discrete variables, while variance is used for continuous variables
- d) Expectation and variance are calculated using the same formula