mod3_precheck

1. Which of the following correctly illustrates conditional probability?
    - ☑ The probability of event A occurring given that event B has occurred
    - ☐ The probability of both events A and B occurring
    - ☐ The probability of either event A or event B occurring
    - ☐ The probability of event A occurring in the absence of event B
2. If events A and B are independent, then $P(A\cap B)$ is:
    - ☐ $P(A)+P(B)$
    - ☐ $P(B)/P(A)$
    - ☑ $P(A)\times P(B)$
    - ☐ $P(A)-P(B)$
3. The percentage of left-handed individuals in a population is 10%. What is the probability that a randomly selected individual is right-handed in this population?
    - ☑ 90%
    - ☐ 10%
    - ☐ 20%
    - ☐ 80%
4. For a diagnostic test of a rare disease, the probability that a person has the disease is 0.01. If the person has the disease, the probability that they test positive is 0.95. However, the test also has a false positive rate of 0.05. Using Bayes' theorem, if a person tests positive, what is the approximate probability they actually have the disease?
    - ☐ 0.01
    - ☑ 0.16
    - ☐ 0.05
    - ☐ 0.95
5. Which of the following best defines a random variable?
    - ☐ A variable that varies randomly
    - ☑ A function that assigns real numbers to outcomes of a random experiment
    - ☐ A variable that can only take integer values
    - ☐ A constant that is associated with a probability distribution
6. What does the probability mass function (PMF) of a discrete random variable provide?
    - ☐ The density of the random variable at a particular value
    - ☑ The probability that the random variable takes on a particular value
    - ☐ The cumulative probability up to a particular value
    - ☐ The mean of the random variable
7. The Cumulative Distribution Function (CDF) of a random variable X at a point x is:
    - ☐ The mean of all values up to x
    - ☑ The probability that X takes on a value less than or equal to x
    - ☐ The probability that X is exactly x
    - ☐ The density of X at the point x
8. Which statement best describes the relationship between standard deviation (σ) and variance $(\sigma^{2})?$
    - ☐ There's no relationship between standard deviation and variance
    - ☐ Variance is the square root of the standard deviation
    - ☑ Standard deviation is the square root of the variance

- ☐ Standard deviation is the square of the variance

9. Which property of expectation is represented by the equation $E(aX+bY)=$ $aE(X)+bE(Y)$ where X and Y are random variables, and a and b are constants?
   - ☐ Associative property
   - ☐ Commutative property
   - ☑ Linearity property
   - ☐ Distributive property

mod3_review

1. If

   $P(A)=0.4$ $P(B)=0.5,$ and $P(A\cap B)=0.2,$ what is $P(A|B)$?

   - ☐ 0.5
   - ☐ 0.8
   - ☐ 0.2
   - ☑ 0.4

2. In a contingency table for smallpox data, if there are 100 individuals who were inoculated and got smallpox out of a total of 400 who were inoculated, what's the probability that a randomly selected individual got smallpox given they were inoculated?

   - ☐ 0.33
   - ☐ 0.5
   - ☐ 0.1
   - ☑ 0.25

3. If a random variable can only take a finite number of distinct values, it is called:

   - ☑ Discrete Random Variable
   - ☐ Linear Random Variable
   - ☐ Uncountable Random Variable
   - ☐ Continuous Random Variable

4. Consider a random experiment of flipping a coin three times. What's the value of the random variable X if X counts the number of heads and the sequence is (H, T, H)?

   - ☐ 3
   - ☐ 0
   - ☐ 1
   - ☑ 2

5. Which of the following is true about Probability Density Function (PDF) of a continuous random variable?

   - ☐ PDF gives the probability that the random variable is exactly a certain value
   - ☐ All values of PDF are negative
   - ☐ It can take values greater than 1
   - ☑ The area under the PDF curve is always equal to 1

6. The expected value or expectation of a random variable is best described as:

    - ☐ The mode of the random variable's distribution
    - ☐ The variability or dispersion of the random variable's values
    - ☐ The point where the random variable's distribution is centered
    - ☑ The weighted average of all possible values the random variable can take on

7. If X and Y are two random variables, and a and b are constants, the expectation $E(aX+bY)$ is:

    - ☐ $E(X)+E(Y)$
    - ☐ $aE(X)-bE(Y)$
    - ☑ $aE(X)+bE(Y)$
    - ☐ $E(XY)$

8. For a random variable X, if the expectation $E(X^{2})=25$ and $E(X)=5$, what is the variance $Var(X) 😒

    - ☐ 5
    - ☑ 0
    - ☐ 25
    - ☐ 50

9. If two random variables X and Y are independent, which of the following is TRUE regarding their variances?

    - ☐ $Var(X+Y)=Var(X)Var(Y)$
    - ☐ $Var(X+Y)=Var(X)-Var(Y)$
    - ☑ $Var(X+Y)=Var(X)+Var(Y)$
    - ☐ $Var(X+Y)=Var(X)/Var(Y)$