

SHEET SOLUTION

1. Which of the following probability distributions is discrete?

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

2. What does conditional probability represent?

- a) The probability of an event occurring given that another event has occurred**
- b) The probability of two independent events occurring simultaneously
- c) The probability of an event occurring in isolation
- d) The probability of an event occurring with absolute certainty

3. Bayes' theorem is used to:

- a) Calculate the probability of an event occurring given prior knowledge**
- b) Determine the expected value of a random variable
- c) Find the median of a probability distribution
- d) Estimate the variance of a sample

4. In Bayes' theorem, $P(A|B)$ represents:

- a) The probability of event A occurring given event B has occurred**
- b) The probability of event B occurring given event A has occurred
- c) The joint probability of events A and B occurring
- d) The marginal probability of event A

5. Which of the following statements is true about the normal distribution?

- a) It is a discrete probability distribution
- b) It is symmetric around its mean**
- c) It is only applicable to small sample sizes
- d) It has a fixed range of possible values

6. Which of the following statements about the Poisson distribution is true?

- a) It is used to model continuous random variables.
- b) It is only applicable to finite sample sizes.
- c) It is characterised by a mean and standard deviation.
- d) It is used to model the number of events occurring in a fixed interval of time or space.**

7. If events A and B are independent, what is $P(A \text{ and } B)$?

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

8. A conditional probability of 0 means:

- a) The events are certain to occur together.
- b) The events are independent.
- c) The events cannot occur together.**
- d) The events have no relationship.

9. What does the variance of a probability distribution measure?

- a) The spread or dispersion of the distribution
- b) The likelihood of an event occurring
- c) The average of the squared deviations from the mean
- d) The probability of the mean value occurring

10. In a binomial distribution, the parameters are:

- a) Mean and standard deviation
- b) Sample size and probability of success
- c) Median and mode
- d) Variance and range

11. If two events are mutually exclusive, what is the probability of both events occurring?

- a) 0
- b) 1
- c) 0.5
- d) Depends on the specific events

12. What does the area under a probability density function (PDF) represent?

- a) The probability of a specific outcome occurring
- b) The mean of the distribution
- c) The median of the distribution
- d) The total probability space

13. Which of the following is a property of the exponential distribution?

- a) It is symmetric around its mean.
- b) It is used to model the time until the next event occurs.**
- c) It is a discrete distribution.
- d) It has a fixed range of possible values.

14. When applying Bayes' theorem, what does $P(B|A)$ represent?

- a) The prior probability of event B occurring.
- b) The probability of event A occurring given event B has occurred.**
- c) The joint probability of events A and B occurring.
- d) The marginal probability of event B.

15. In a uniform distribution, the probability density function is:

- a) Constant within a specified range.**
- b) Skewed to the left.
- c) Skewed to the right.
- d) Bell-shaped.

16. Which of the following statements about the Bernoulli distribution is true?

- a) It models the number of successes in a fixed number of independent trials.**
- b) It is characterised by two parameters: mean and variance.
- c) It is a continuous probability distribution.
- d) It is used to model continuous random variables.

17. What is the formula for conditional probability?

- a) $P(A \text{ and } B) = P(A) * P(B)$
- b) $P(A | B) = P(A) + P(B) - P(A \text{ and } B)$
- c) $P(A | B) = P(A) * P(B)$
- d) $P(A \text{ and } B) = P(A | B) * P(B)$

18. In a normal distribution, approximately what percentage of the data lies within one standard deviation of the mean?

- a) 25%
- b) 50%
- c) 68%
- d) 95%

19. When do we use the binomial distribution?

- a) When the number of trials is fixed and the probability of success is constant.
- b) When the number of trials is infinite.
- c) When the probability of success changes with each trial.
- d) When the outcomes are continuous.

20. What does the cumulative distribution function (CDF) represent?

- a) The probability of an event occurring exactly at a specified value.
- b) The probability of an event occurring within a specified range.
- c) The mean of the distribution.
- d) The total number of trials in the distribution.

21. A bag contains 8 red balls and 5 blue balls. If one ball is drawn at random from the bag, what is the probability that it is red?

a) $5/13$

b) $8/13$

c) $8/5$

d) $5/8$

22. A standard deck of playing cards contains 52 cards. What is the probability of drawing a heart or a spade from the deck?

a) $13/52$

b) $26/52$

c) $39/52$

d) $52/52$

23. An experiment has 3 equally likely outcomes. What is the probability of getting the first outcome twice in a row?

a) $1/3$

b) $1/9$

c) $1/6$

d) $1/2$

24. A jar contains 10 red marbles, 8 blue marbles, and 6 green marbles. If one marble is drawn at random from the jar, what is the probability that it is either red or green?

a) $4/12$

b) $5/12$

c) $7/12$

d) $9/12$

25. A fair coin is flipped three times. What is the probability of getting exactly two heads?

a) $1/8$

b) $1/4$

c) $3/8$

d) $1/2$