Types of distribution and types of density in stat

In statistics, probability distributions are mathematical functions that describe the likelihood of different outcomes or values for a random variable.

There are various types of probability distributions, and they can be classified into two main categories: discrete distributions and continuous distributions.

Here's an overview of the types of probability distributions and density functions:

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1. **Discrete Probability Distributions:**

- **Bernoulli Distribution:** A distribution for a binary random variable that takes only two possible outcomes, typically labeled as "success" and "failure."

- **Binomial Distribution:** Describes the number of successes in a fixed number of independent Bernoulli trials.

- **Poisson Distribution:** Models the number of events occurring in a fixed interval of time or space when events occur with a known average rate and are independent of the time since the last event.

- **Geometric Distribution:** Models the number of Bernoulli trials required for the first success.

2. **Continuous Probability Distributions:**

- **Uniform Distribution:** All values within a specified range are equally likely.
- **Normal Distribution (Gaussian Distribution):** Often referred to as the bell curve, it's characterized by its symmetrical, bell-shaped curve. Many natural phenomena tend to follow this distribution.

- **Exponential Distribution:** Models the time between events in a Poisson process, such as the time between arrivals of customers at a service center.

- **Gamma Distribution:** Generalizes the exponential distribution and can be used to model the waiting time until a Poisson process reaches a certain number of events.

- **Beta Distribution:** Often used to model random variables that are constrained to a finite interval.

- **Log-Normal Distribution:** The natural logarithm of a random variable follows a normal distribution.

- **Cauchy Distribution:** Known for its heavy tails and lack of finite moments.