

# Probability Distributions Codebook

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7 variables documented

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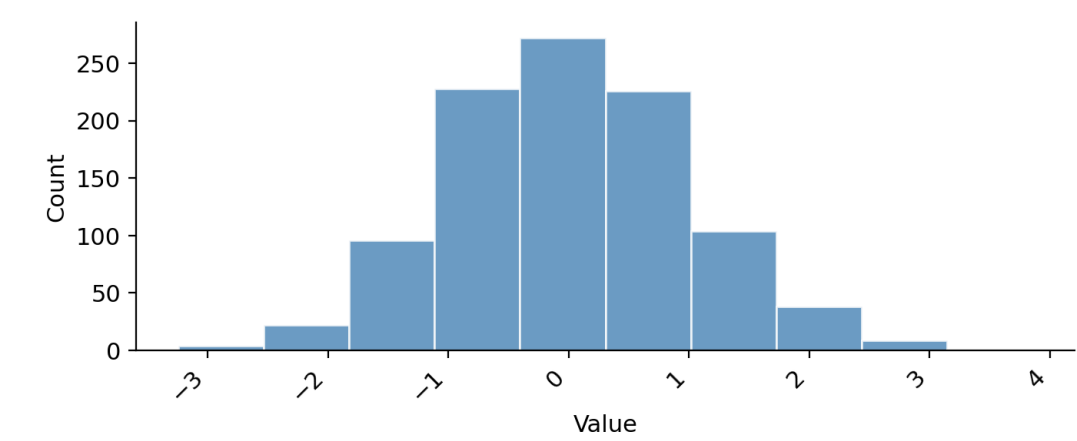
Standard normal distribution

Type: float64

Note: Parameters:  $\mu$  (mean) = 0,  $\sigma$  (std dev) = 1. The normal distribution is symmetric and bell-shaped, commonly used to model natural phenomena.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	1000
Mean	0.02
Std Dev	0.98
Min	-3.2412673400690726
Max	3.852731490654721



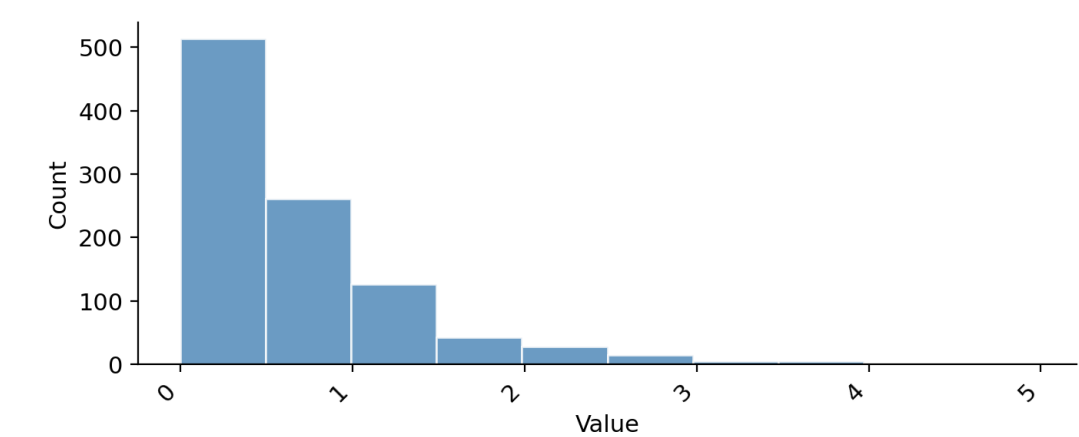
Exponential distribution

Type: float64

Note: Parameters:  $\lambda$  (rate) = 1.5. Models time between events in a Poisson process. Commonly used for survival analysis and reliability engineering.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	1000
Mean	0.67
Std Dev	0.67
Min	0.00214896890148975
Max	4.961148606469603



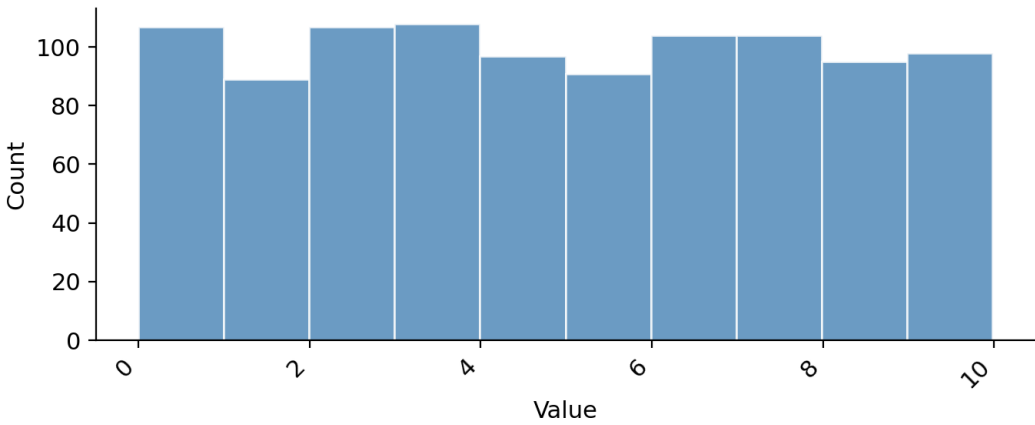
Continuous uniform distribution

Type: float64

Note: Parameters: a (min) = 0, b (max) = 10. Every value in the interval has equal probability. Used for random sampling and Monte Carlo simulations.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	1000
Mean	4.94
Std Dev	2.89
Min	0.00011634755366141114
Max	9.978208556819782



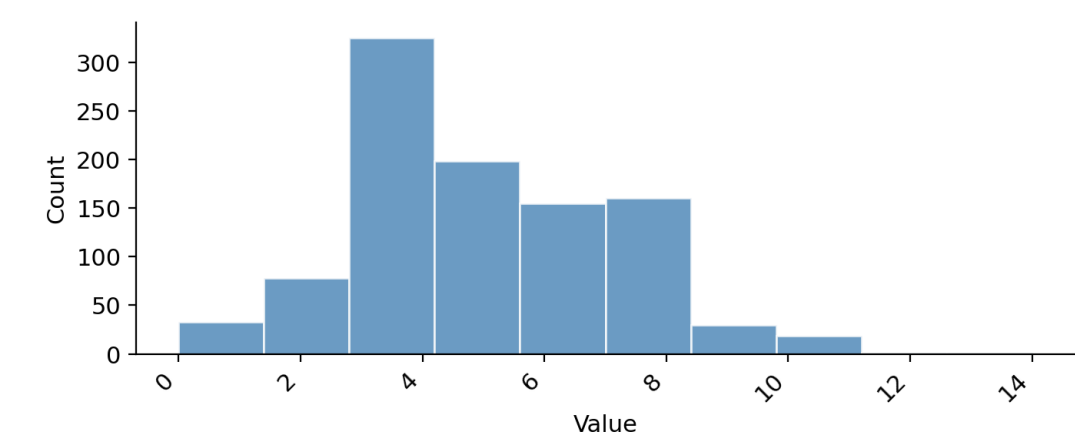
Poisson distribution

Type: int64

Note: Parameters:  $\lambda$  (rate) = 5. Models count of events in a fixed interval. Common in queueing theory and epidemiology.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	14
Mean	4.93
Std Dev	2.07
Min	0
Max	14



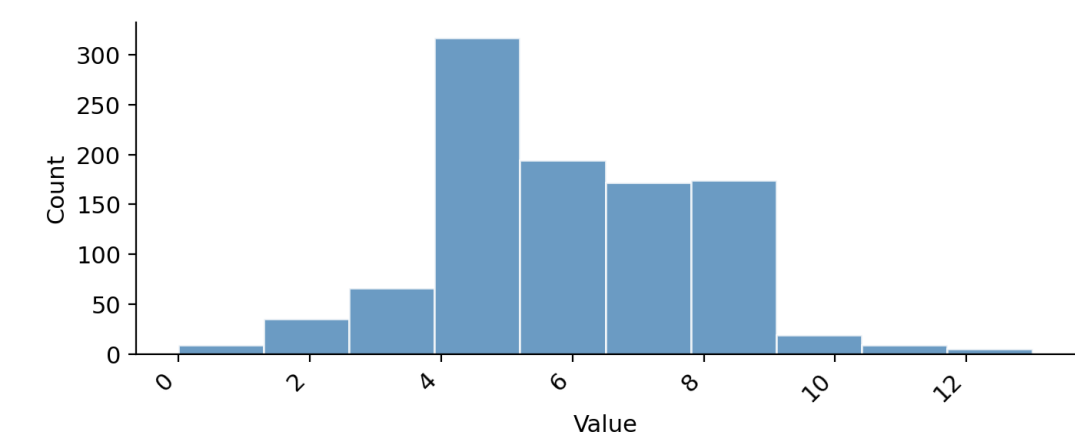
Binomial distribution

Type: int64

Note: Parameters: n (trials) = 20, p (success probability) = 0.3. Models number of successes in a fixed number of trials. Used in quality control and clinical trials.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	14
Mean	5.90
Std Dev	2.01
Min	0
Max	13



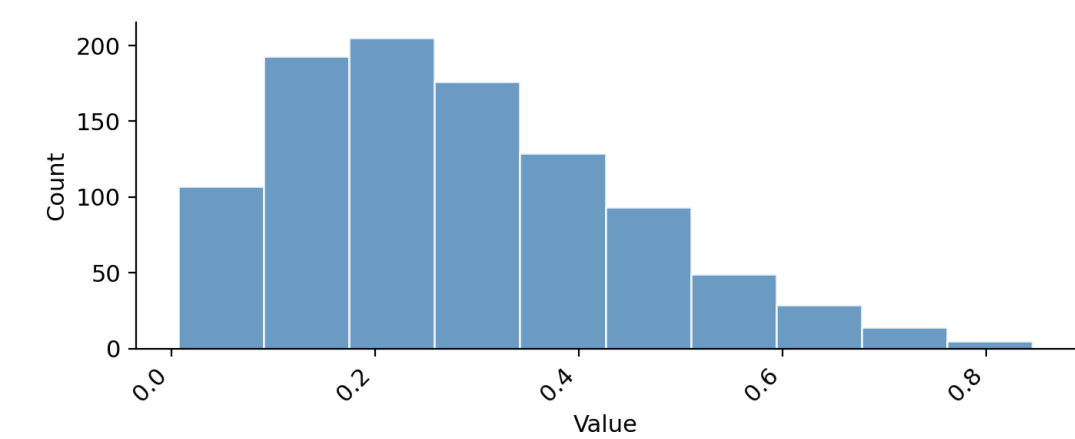
Beta distribution

Type: float64

Note: Parameters:  $\alpha$  (shape) = 2,  $\beta$  (shape) = 5. Bounded between 0 and 1, useful for modeling proportions. Common as a prior in Bayesian statistics.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	1000
Mean	0.28
Std Dev	0.16
Min	0.007263757171461416
Max	0.8449393803434533



Gamma distribution

Type: float64

Note: Parameters: k (shape) = 2,  $\theta$  (scale) = 2. Generalizes the exponential distribution. Used to model waiting times and insurance claims.

Summary Statistics

Count	1000
Valid	1000
Missing	0 (0.0%)
Unique	1000
Mean	3.99
Std Dev	2.88
Min	0.13633696830598757
Max	17.785205693156033

