Review

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Topics

- Sample space
- Simple Counting
- Axioms of probability and propositions
- Conditional probability. Bayes' theorem. The law of total probability
- Independence. Conditional independence

Topics

- Random variables: discrete vs continuous
- Distribution functions: pmf and pdf
- Cdf
- Expected value and variance. Properties

Topics

- Distributions: pmf or pdf, range that r.v. can take, expected value and variance, cdf for some distributions
- Discrete distributions: Uniform, Bernoulli, Binomial, Geometric, Negative Binomial, Poisson
- Continuous distributions: Uniform, Normal, Normal Approximation, Exponential, Poisson process, Gamma, Gamma function, Beta

Topics

- Joint Distributions. Joint pmf, pdf, and cdf. Marginal pmfs and marginal pdfs.
- Covariance and correlation. Definition, properties, meaning.
- Hierarchical models. Multivariate distributions
- Descriptive statistics: population, sample, inference, histograms, quartiles, boxplots
- Sample mean and sample standard deviation calculation
- Sampling Distributions. Central limit theorem

Topics

- Point Estimation. Statistic. Parameter. Estimator. Estimate. Bias. MSE.
- Method of Moments. Solve.
- Method of Maximum Likelihood. Solve. Properties.
- Confidence Intervals. Meaning. Pivotal quantity. Solve. Interpretation.
- Hypothesis testing. Idea. Type I and Type II errors. Power. Sample size determination. P-value. Relation to Confidence Intervals. Solve. Interpretation.