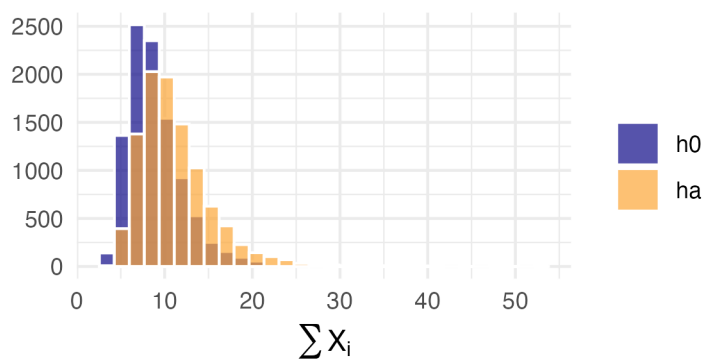
21: LIKELIHOOD RATIO TESTS

Stat250 S25

Prof Amanda Luby

Most of the inference that we've covered so far has been for limited settings (e.g. binomial or normal data) or based on simulation (e.g. bootstrap). Today, we're going to talk about some of the theoretical underpinnings for setting up more complicated tests.

Example: Suppose we observe $X_1, ..., X_9 \sim Exp(\theta)$ and are interested in testing $H_0 : \theta = 9$ against $H_A : \theta = 10$.



Likelihood Ratio Test Statistic

Neyman-Pearson Lemma

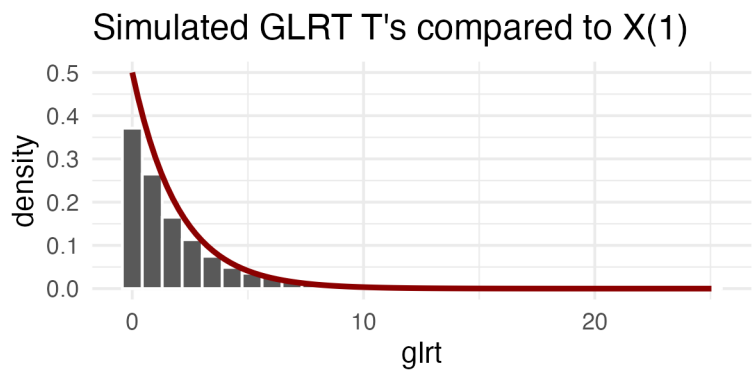
Example: Consider a sequence of n independent Bernoulli random variables $X_1, ..., X_n$. We are interested in the most powerful test for $H_0 : p = .4$ versus $H_A : p = .3$. Derive the form of the rejection region for this test directly. How would you define an α level test in this case?

1 LRT for Composite Hypotheses

Generalized Likelihood Ratio Test Statistic

Example: Suppose we observe $X_1, ..., X_9 \sim Exp(\theta)$ and are interested in testing $H_0 : \theta \leq 8$ against $H_A : \theta > 8$.

Wilk's Theorem



Example: Consider a sequence of n independent Bernoulli random variables $X_1, ..., X_n$. We are interested in the most powerful test for $H_0 : p = .4$ versus $H_A : p < .4$. Derive the form of the rejection region for this test directly. How would you define an α level test in this case?