Homework 3, STAT764

1. Suppose that $x_1, x_2, \ldots, x_n$ is a random sample from a normal population with unknown mean μ and unknown variance. Use the likelihood ratio method to derive the T test statistic.

2. Generate 30 normal random numbers with mean 2.2 and variance 4. For your simulated data, test the following hypotheses:

$$\mathscr{H}_0 : \ \mu = 2 \quad \longleftrightarrow \quad \mathscr{H}_a : \ \mu \neq 2,$$

assuming that

(i) $\sigma = 2$,

(ii) σ is unknown.

3. Generate 40 normal random numbers with mean 2 and variance 1.1. For your simulated data, assume that the population mean μ is an unknown parameter,

(i) test the following hypotheses:

$$\mathscr{H}_0 : \ \sigma^2 = 1 \quad \longleftrightarrow \quad \mathscr{H}_a : \ \sigma^2 > 1,$$

and

(ii) find a 95% confidence interval of σ^2.