Homework 1 (Due on 4/13)

Question 1 8.3 of "Casella and Berger".

Question 2 8.6 of "Casella and Berger".

Question 3 Derive the LRT for one-way layout.

Question 4 Let $X_{11}, \ldots, X_{1n_1} \overset{i.i.d.}{\sim} \mathcal{N}(\mu_1, \sigma^2)$, and independently $X_{21}, \ldots, X_{2n_2} \overset{i.i.d.}{\sim} \mathcal{N}(\mu_2, \sigma^2)$. Find the LRT for the hypothesis $H_0 : \mu_1 \leq \mu_2$ versus $H_1 : \mu_1 > \mu_2$. Is it equivalent to the two-sample one-sided t-test?

Question 5 Let $\vec{X}_1, \ldots, \vec{X}_n \overset{i.i.d.}{\sim} \mathcal{N}_p(\vec{\mu}, \mathbf{\Sigma})$. Derive the LRT for $H_0 : \vec{\mu} = \vec{\mu}_0$ versus $H_1 : \vec{\mu} \neq \vec{\mu}_0$. Is it equivalent to the T^2 statistic?

Question 6 Let $\vec{X}_1, \ldots, \vec{X}_n \overset{i.i.d.}{\sim} \mathcal{N}_p(\vec{\mu}, \mathbf{\Sigma})$. Derive a union-intersection test for $H_0 : \vec{\mu} = \vec{\mu}_0$ versus $H_1 : \vec{\mu} \neq \vec{\mu}_0$. Is it equivalent to the T^2 statistic?