1. Suppose T_n, $n = 1, 2, \ldots$, is a sequence of estimators for the parameter θ, for which

$$\sqrt{n}\,(T_n - \theta) \xrightarrow[w]{} N(0, \tau^2) \quad (n \to \infty).$$

To estimate $g(\theta)$ we use $g(T_n)$ as an estimator. Derive the asymptotic ~~properties~~ distribution of the sequence $g(T_n)$, $n = 1, 2, \ldots$, of estimators in case $g'(\theta) = 0$, $g''(\theta) \neq 0$
[Hint: Taylor-series]

2. Show that the likelihood equation has a unique solution for distributions belonging to the exponential family.
[1-dimensional parameter, canonical parametrization].

3. The consistency of a sequence of estimators. Present a definition and justify why consistency is an important property ~~[illegible]~~ in statistical inference.

Derive a consistent sequence of estimators for the parameter

$$p = P(\underline{X} \leq x_0) \qquad (x_0 \text{ fixed})$$

Give justification for the consistency property.

4. Determine the LR-test statistic in the case $\underline{X} \sim N(\mu, 1)$:

$$H_0 : \mu = \mu_0$$

$$H_1 : \mu \neq \mu_0.$$

Describe this also graphically by using the logarithmic likelihood function.