1. Concept Review:
   - Delta Method
   - Sufficiency and Factorization Theorem
   - Minimal Sufficiency

2. Exercises
   (a) Let $X_1, \ldots, X_n$ denote a random samples from a common distribution with kurtosis 3. Given the fact that
   \[
   \sqrt{n} \left( \frac{\bar{X} - \mu}{S^2 - \sigma^2} \right) \overset{d}{\to} N_2 \left( 0, \begin{pmatrix} \sigma^2 & 0 \\ 0 & 2\sigma^4 \end{pmatrix} \right)
   \]
   Derive the asymptotic distribution of properly scaled $\frac{\bar{X}}{S}$
   (b) Let $X_1, \ldots, X_n$ denote a random sample from Beta($\gamma, \gamma$).
      i. Find a nontrivial sufficient statistic for $\gamma$.
      ii. Is the statistic we obtain from (i) minimal?
   (c) Let $Z_1, \ldots, Z_n$ denote a random sample from standard extreme value distribution,
   $f_0(z) = e^{-z} \exp(-e^{-z}), \ z \in \mathbb{R}$
      i. If $X_i = Z_i + \theta$, derive the density function for $X_i$ and, if possible, find a non-trivial sufficient statistic for $\theta$.
      ii. If $X_i = \sigma Z_i$, derive the density function for $X_i$ and, if possible, find a non-trivial sufficient statistic for $\sigma$.

3. Open for question.