Tutorial 9

STAT 3013/4027/8027

1. SI Example 4.8. Simply write out the steps as outlined in the example. This is the classic t-test.
2. Consider a Poission regression model using the canonical link function (how do we determine the canonical link function?):

$$\begin{aligned} Y_1, \ldots, Y_n &\overset{\text{indep.}}{\sim} \text{Poisson}(\lambda_i) \\ \log(\lambda_i) &= \beta_0 + \beta_1 x_i + \beta_2 x_i^2 \\ &\text{for } i = 1, \ldots, n. \end{aligned}$$

- Using `optim()` and the data on the website to find the MLEs: $\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2$, as well as their estimated asymptotic variances.
- Additionally, using the bootstrap procedure discussed in class, provide the estimated biases and variances for the parameters.
- Data: A sample from a population of 52 female song sparrows was studied over the course of a summer and their reproductive activities were recorded. In particular, the age and number of new offspring were recorded for each sparrow (Arcese et al, 1992). Let $Y =$ fledged (number of offspring), and $X =$ age (age of mother).

3. SI 4.19, 5.1.