CSD3240/SEM4108/MAT340 Week 11 Tutorial

Question 1. Suppose we flip a coin 10 times and we record 8 heads, 2 tails. Let p be the true probability of flipping heads.

1. Given this data, a likelihood function L for the parameter p.
2. Find all the critical points of L.
3. Find the maximum likelihood estimator $\hat{p}$.

Question 2. A computer network experiences 4 disconnections in one minute, 2 in another minute and 7 in another minute. Assume the number N of disconnections in one minute follows a Poisson distribution with parameter Λ, so

$$\Pr(N = k) = \frac{e^{-\Lambda}\Lambda^k}{k!}.$$

1. Given this data, a likelihood function L for the parameter Λ.
2. Find all the critical points of L.
3. Find the maximum likelihood estimator Λ.

Question 3. Suppose we are trying to model the probability q of winning the lottery using a geometric distribution. Suppose we have one sample, where a person wins the lottery the second time he plays.

1. Find a likelihood functtion L for the paramter q.
2. Find all critical points of L
3. Find the maximum likelihood estimator $\hat{q}$.
4. Compute the upper limit p_h of the 95% confidence interval for q.
5. Compute the lower limit p_l of the 95% confidence interval for q.