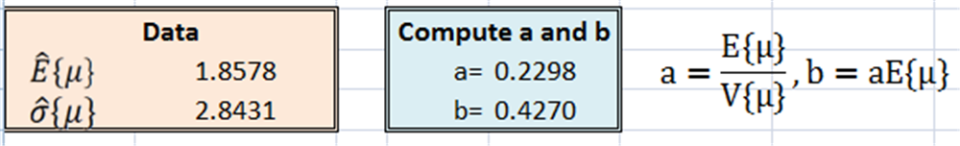
# Chapter 8. What to optimize

## Likelihood: Parameters for the NB distribution with Colorado data.

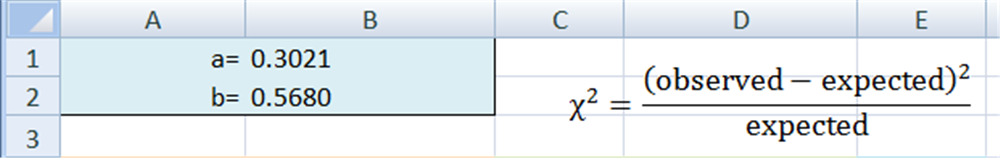
The data for this problem (0-1 mile long Colorado road segments) are in the ‘Colorado Segments.xls’ file. If the probability of a segments to have ‘k’ accidents was in accord with the Negative Binomial distribution with parameters ‘a’ and ‘b’ (see equation 8.1) what, based on these data, would be their maximum likelihood estimates?

Using the same data, ‘a’ and ‘b’ were estimated earlier using two other approaches. First, in part b of Problem 2 of Chapter 1 and using the ’Method of Moments’ the estimates in Figure 1 were obtained.



Figure

Later, in part a of Problem 1 of Chapter 5, ‘a’ and ‘b’ were estimated so as to minimize the of the fit. These estimates are Figure 2.



Figure

Here the task is to estimate ’a’ and ‘b’ by maximizing likelihood.

## Using various objective functions for signalized intersection data

The data for this problem pertain to 515 signalized intersections in Edmonton and are in the ‘Edmonton 4-legged Signalized Intersections.xls’ , We have (among other variables) information about the average major and minor road AADTs and multivehicle injury accident counts over six years. The task here is to estimate the parameters of the model equation:

Estimate the parameters by

1. Minimizing the sum of squared differences. To avoid this disparity in parameters and the associated problems it might cause for the Solver, it is best to normalize the AADTs and to define .
2. Maximizing the Poisson likelihood
3. Try the same without normalizing the AADTs. How does the Solver react?
4. Estimate parameters by maximizing the Negative Binomial likelihood
5. Estimate parameters by minimizing the sum of absolute differences
6. Estimate parameters by minimizing the sum of
7. Optimizing an objective function of your choice
8. Assemble all estimates

## Goodness of fit

The question here is which of the objective functions in problem 2 produced the best CURE plot.