HOMEWORK WEEK 1

A municipality is interested in analyzing the use of public transportation by its inhabitants for their work trips. For this purpose, the following questions were asked to a sample of 3000 workers within the area of study:

- Do you use public transportation to go to work?

- What is your level of income?

The responses are included in the following contingency table:

	Low	Medium	High	Total
	Level of income	
Public transportation	630	990	45	1665
Other modes	270	660	405	1335
	900	1650	450	3000

Identify the model that makes sense from a behavioral point of view, and perform the following tasks.

1. Calculate the estimates $\widehat{\pi}_1$, $\widehat{\pi}_2$ and $\widehat{\pi}_3$ of the parameters π_1, π_2 and π_3 using the contingency table ($\pi_j = P(i|k = j)$, where i is the dependent variable, k the independent variable and j represents the levels that the variable k can take).

2. Calculate the standard errors of the estimates $\widehat{\pi}_1$, $\widehat{\pi}_2$ and $\widehat{\pi}_3$.

3. In order to test the behavioral assumption against the data, answer the following questions:

   (a) What is the log likelihood of the developed model (unrestricted model)?

   (b) What is the estimate of the parameter specifying the restricted model (defined by the null hypothesis)?

   (c) What is the log likelihood of the restricted model?

   (d) Using a level of significance of 5%, can we reject the null hypothesis?