

## Problem

The data in the table below are from an investigation into satisfaction with housing conditions in Copenhagen (Madsen 1971). Residents in selected areas living in rented homes built between 1960 and 1968 were questioned about their satisfaction and the degree of contact with other residents.

	Low satisfaction		Medium satisfaction		High satisfaction	
Contact with others:	Low	High	Low	High	Low	High
Tower block	65	34	54	47	100	100
Apartment	130	141	76	116	111	191
House	67	130	48	105	62	104

- i) Summarize the data using appropriate tables of **percentages** to show the pair-wise associations between the levels of satisfaction and 1) contact with other residents and 2) type of housing. Comment on patterns in the associations.
- ii) Use nominal logistic regression model for the associations between response variable, the levels of satisfaction, and the other two variables. Obtain a model that summarizes the patterns in the data. Describe your findings (the pattern in the associations, odds ratios with 95% confidence intervals, goodness-of-fit). (Hint: use dummy variable for house types)  
(optional; required for PhD) Is there interaction of contact level by house type?
- iii) As the response has ordinal categories, fit proportional odds model to the data that include the same variables as used in the nominal logistic model obtained in (ii). What does the fitted model tell?
- iv) Calculate Pearson residuals from the proportional odds model for ordinal response to find where the largest discrepancies are between the observed frequencies and expected frequencies estimated from the model.